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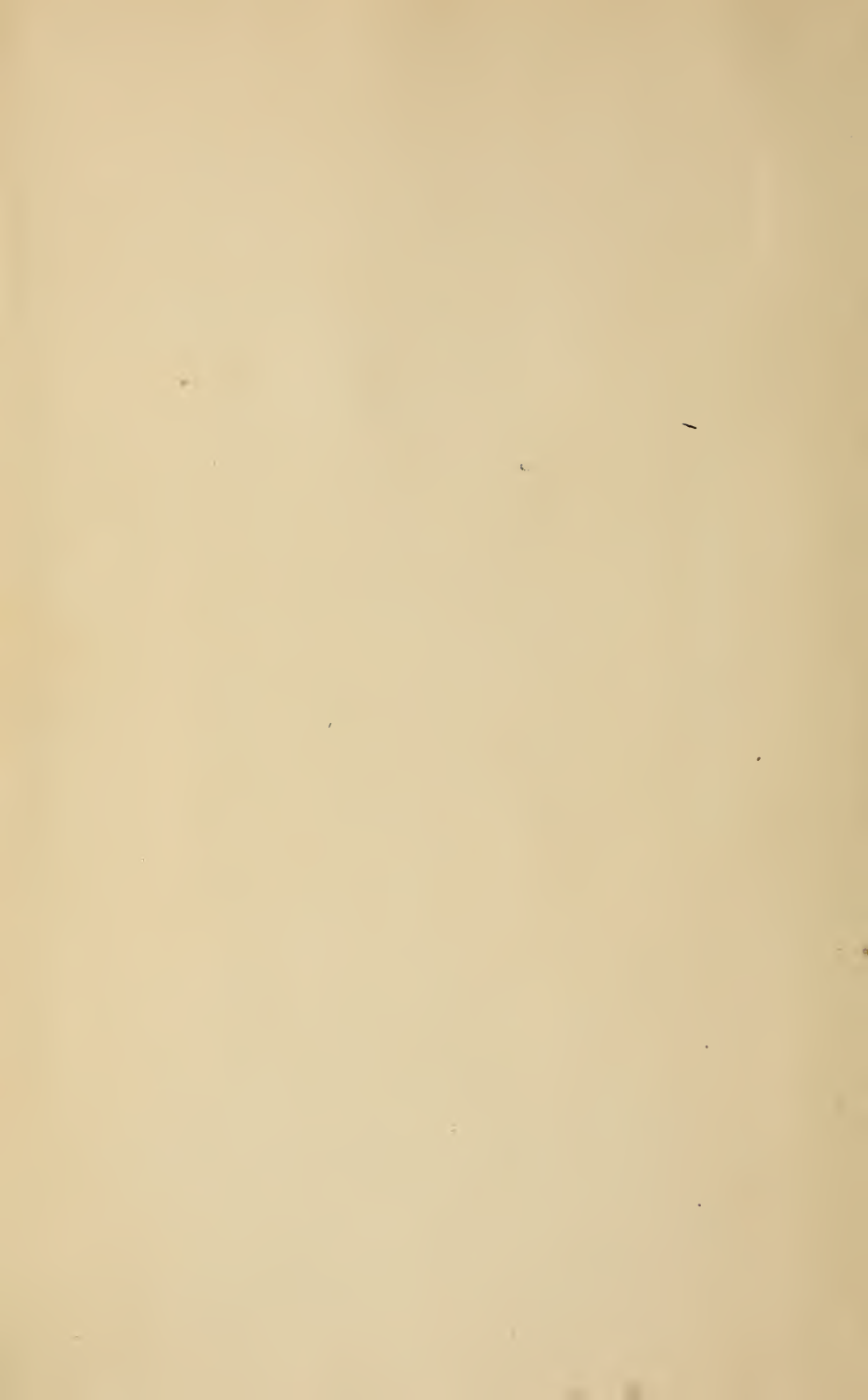
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THE JOURNAL

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THE JOURNAL

OF

THE ALLIED SOCIETIES

VOL. VI.

MARCH, 1911

No. 1

ARE WE BUILDING FOR THE PRESENT OR THE FUTURE?

The answer to this query will, it is feared, not be found in the dental literature of the period, indeed if that be taken as evidence, it might be affirmed with truth that this said profession is not building at all for the more enlarged thought of the coming time, but it has, apparently, completed an edifice and proposes to roof it in as quite sufficient for its needs now, and for future periods. If this feeling were confined to the few it might be permitted to work out its own solution, but, unfortunately, the note of self-satisfaction is beginning to assert itself in high positions, indicating that a period of torpidity is extending throughout the professional body. We seem to be drifting into the morass of intellectual life, the miasma of which is producing a species of mental toxemia detrimental to all future activity.

The evidence of this seems to be strikingly apparent in the proceedings of the National Dental Association, recently held in Denver, Colorado. This body is supposed to exhibit the best element of the dental profession in the United States, and its utterances carry with them, or should do so, an influence far-reaching for good or the reverse. Hence it is the duty of the journalist to analyze its work and judge whether this strikes a note in harmony with the past, present or future.

A critical examination of the proceedings of this body does not result in much illumination, in fact it may be questioned

whether it did not settle down to the opinion, that changes in any direction would be detrimental, and that all our acquisitions answered to our entire needs. The truth of this is very evident in the address of the President. This indicates throughout a lively sense of appreciation of things past and general satisfaction with things present. In considering the standing of the dental profession he has this to say, "From various sources we hear of efforts made to belittle our standing as a profession and of attempts to merge it into Stomatology, as a branch of the medical profession." Further on he says, "Our detractors all are of the self-centered, 'holier than thou' type," and again, "Stomatology is a freak specialty, because it endeavors to embrace syphilology, rhinology, surgery of the head, dental surgery, * * * in fact all lesions which find any expression in the oral cavity."

A Committee was appointed to take this address into consideration. This Committee consisted of three members and its report is quite lengthy. It seems to have considered the President's allusion to Stomatology as, by far, the most important section of the address, and it therefore devoted much space to its consideration, which is in part as follows: "Your Committee feels that the references made in the President's address to the Stomatological movement are both timely and pertinent. * * * * Your Committee fails to see any justification whatever for the existence of a specialty of medicine to be designated as Stomatology," and winds up the consideration of this subject in this wise. "In view of the general agitation of this matter, it appears to your Committee to be an opportune occasion for the National Dental Association to place itself clearly on record before the world as to its position in regard to this important question, and to give its moral support and aid to those organized bodies of our profession throughout the world, who in their various localities are at present contending with the activities of the stomatological fetish."

The writer is generally conversant with periodical dental literature, but he has failed to observe any serious agitation of this matter and it would seem that the National Dental Association, through its President, and the before-mentioned Committee have erected windmills for the specially prepared Don Quixotes to try and knock these to pieces. If, as asserted, this Stomatology

has become a "fetish," is that a very serious matter? What is Stomatology? It has to do with the science of the mouth, or as the Century Dictionary defines it, "The sum of scientific knowledge concerning the mouth." Will the President of the National Dental Association, and also those who sympathize with him, tell us what is the dentistry on this planet for if not to conserve the health of the oral cavity? If Stomatology means this then it far transcends in value, as a definition of our professional work, that of any other name. The writer is not aware that any one is ashamed of the name dentist, or the title designating college work and college examinations, but there are many who recognize it as representing only a partial truth. In the earlier decades of the 19th century the designation dentist was appropriate to the man emerging from the leecher and bleeder period who confined his attention solely to the teeth. In the progress of years this was changed to the treatment of all pathological conditions presenting in the oral cavity and to all surgical cases requiring attention in the tissues adjacent thereto. Magitot was, beyond all question, correct when he suggested the word Stomatologist as better representing the professional idea. If to adopt this means a fetish—an object of devotion----it is certainly to be desired that this should extend throughout the dental world. We need more than aught else a single-hearted devotion to the higher interests. There is too much commercialism creeping in and making the teeth alone a fetish as representing the means whereby the largest income may be derived. What will the world of dental science think when it reads that the National Dental Association adopted the report of the Committee without a single word of protest? Will not the scientific minds rightly conclude that American dentistry means, as its name implies, the care of the teeth and nothing more and, as they thus view it, they would be justified in placing the dentist of the United States upon a lower scientific level.

The present period is one in which there must be division of labor. No one mind can accomplish the entire field belonging to our profession. Medicine to-day is and has been subdivided into many branches: Surgery, Ophthalmology, Orthopaedics, Gynecology, Obstetrics, etc. The public has become educated to this and would not think of calling on the general

medical practitioner to treat the eye, or, if he was thus visited, he would, if honest, direct to the skilled ophthalmologist. This is true of all the other specialties of medicine. It is equally true that the specialist would not attempt to enter the domain of general practice.

If then the future should hold in medicine a branch of Stomatology, it would have the same rank with the other specialties, but with the layman it would be known always as dentistry. The man in the street is not equal to nice discriminations and the ophthalmologist is always the "Eye doctor," and whatever the latter's qualifications may be the layman would not think of calling him to a case of typhoid fever.

It is unnecessary to extend this branch of the subject, the facts being too well known to require enlargement. Stomatology may, or may not be in the future a part of medical teaching, but if it should it will have its proper place.

It is one of the strange vagaries of the human mind that, as a rule, it refuses to look beyond the present or build for posterity in any special work in which it may be engaged. There are, of course, exceptions to this, but the average individual is satisfied to let things drift. To the writer it seems important that the dental mind should be active in preparing for that which is sure to come in his profession. It is the extreme of folly to hurl invectives against those who think differently and are, perhaps, wiser in their generation. We as a profession, may not like the prospect of eventually merging into medicine, but this is as certain to come as that this century will be followed by the next. The M. D. degree means nothing to the well balanced professional mind, but it does represent to the layman a higher standard and this estimate has held for centuries and cannot now be displaced. It is recognized in law as the D. D. S. is not, nor will it ever be. The social side of this is unworthy a moment's thought. No self-respecting dentist ever takes this into consideration, for he knows it is the man always, and not the tail ending degrees, that mark his position of respectability among all classes of people.

The approaching time when the dentist of the future will be required to practice under the degree of Doctor of Medicine should cause the teacher to regard it with interest not free from

grave anxieties. The curriculum of that future can be left for the time to arrange, but it will require rare wisdom to meet its difficulties. There is no specialty of the healing art as complex as this, indeed so much is this the case that its subdivision into branches has become a necessity and we have Oral Surgery, Prosthetics, Orthodontia, the Anaesthetist, the Bridge Worker and General Operative Practitioner. To reconcile all these and make them worthy of a composite whole will mean more than ordinary ability in organization.

It is sufficient for this time that these changes be regarded as the steps of progress sure to be with us before the twentieth century closes its historical record. Let the youth be taught the lesson of that future and when the time arrives the dental profession will be prepared to grasp its full meaning. This lesson, however, with all the combined wisdom of succeeding decades, will never be properly learned and made part of professional life until the past has been grasped in all its essentials. Edmund Burke aptly phrased this when he wrote: "People will not look forward to posterity who never look backward to their ancestors."

Time, with its revolving cycle of events, lies before us and in the ever widening circles we may, if we will, see the new life of our profession enmeshed, but not narrowed, in the ancient storehouse of the venerated Mother, Medicine, wherein lies enshrined a portion of the collected altruistic wisdom of the ages.

JAMES TRUMAN.

OCULAR MANIFESTATIONS OF THE PERIPHERAL AFFECTIONS OF THE FIFTH CRANIAL NERVE.*

BY GEORGE HUSTON BELL, M. D.,

Assistant Surgeon New York Eye and Ear Infirmary (Ophthalmic Department), Member New York Ophthalmological Society, Member American Ophthalmological Society and Fellow of New York Academy of Medicine, etc., etc.

The Trigeminal, or fifth cranial nerve, is chiefly sensory, although it has also an important function in the innervation of the muscles of mastication. It is the purpose of this paper to deal with the peripheral affections of the Ophthalmic, the superior and inferior maxillary divisions of the Trigeminal, as they are the branches which have close relations with the eye and its appendages. The relations existing between the various branches of this nerve have always been of interest to the Ophthalmologist, and why more people do not have acute symptoms from the various nerve terminals when so often so many of them are freely exposed—has always been a mystery to me.

Many inflammatory conditions of the eye are due to reflex causes, not the least of which are affections of the teeth. And well may this be so when you stop to consider that the branches of the nerve that supplies the teeth and the eyes come off from the same ganglion.

“Despagnet” says we are probably recognizing more and more the real connection between dental and ocular diseases. He holds that the same periosteum which lines the orbital cavity extends to the alveolar border of the upper jaw; the mucous membrane of the mouth is in direct continuation with the conjunctiva. Many times the roots of the upper teeth project directly into the antrum of Highmore, and from this situation diseases frequently reach the orbit through the thin partition of bone. The angular artery and certain veins run almost directly from one region to the other.

*Read before The New York Institute of Stomatology, October 4, 1910.

The same general nervous supply reaches both. Not only through the fifth cranial, but also through the sympathetic.

According to Fox (2) "Dental affections provoke ocular trouble in two different ways. First, by inflammation or irritation of the Trigeminal nerve, due to dental affections, causing reflex troubles in a manner similar to that in which neuralgia of the fifth nerve, or Tic Douloureux is produced. Second, by the extension of the inflammatory process of the dental root toward the maxillary sinus and thence toward the orbit by continuity and contiguity of structure."

Fox reports a case where Hypopyon developed in a cataract patient eight days after extraction of lens coincidentally with an abscess of the tooth. The true relation, however, between these structures is not clear.

Parinaud (3) has demonstrated that in children of five or six years when they are beginning to lose their deciduous teeth and also in adults, dental lesions not always apparent may be the starting point of osseous or periosteal changes of the interior orbital border, of fistula in lachrymal sac or lower lid, and also periostitis of the nasal canal.

Henry Power (4) in 1883 read a meritorious paper before the Odontological Society of Great Britain, calling attention to the relationship existing between the teeth and the eyes, and pointing out the occurrence not only of corneal ulcerations, but also Glaucomatous symptoms, mydriasis, myosis, paralysis extra ocular muscles, failure of accommodation and exophthalmos in the course of dental diseases. Irritation of the fifth nerve due to carious teeth has produced defects of vision. In this connection will state that Power cites a case which occurred in the practice of Sir Wm. Lawrence, of a man thirty years old who suffered blindness for a period of fifteen months which was restored by the extraction of an upper first molar. An examination of the tooth revealed a small splinter of wood one-fourth of an inch long—undoubtedly the fragment of a toothpick—that had traversed the center of the decayed tooth. Numerous cases of reflex dental origin have been reported from time to time—Cafe (5), Sloggett (6), Brucke (7), Gaine (8), Allport (9), Turner (10), Coleman (10), Stevens (11), have recorded instances of ama-

rosis in which dental disorders have figured as important causative factors. Among other diseases which manifest themselves as a result of inflammation of the Trigeminal, whether reflex or inflammatory, may be mentioned:

Conjunctivitis, Neurotic Oedema, Chronic Oedema of the lids, Trophic disorders, Glaucoma, Phlyctenular Conjunctivitis and Keratitis, Tic Douloureux, Migrane, Neuro-Paralytic Keratitis, Ocular pain, Photophobia, Orbital abscess, Iritis, Cyclitis, Paralysis of accommodation, dilation of the pupil, spasm of the external ocular muscles, orbital cellulitis, and Herpes Zoster Ophthalmicus.

This last mentioned disease follows the peripheral distribution or the super-orbital nerve. The Papules are grouped together along the course of this nerve, accompanied by excruciating neuralgic pains. The cornea frequently becomes involved with disastrous results. The line of demarcation in this disease is well drawn and presents a beautiful clinical picture.

Conjunctivitis has been attributed to disorders of the teeth by Forster, Kempton, Fox and others in certain cases, and relieved by extraction of the offending teeth.

According to Brown (12) Glaucoma, with its corneal anesthesia, Neuralgia and trophic changes in the optic nerve, certainly is attended with involvement of the fifth nerve, but whether the disturbance of the Trigeminal is a primary condition has yet to be proved. Nance (13) reports a very interesting case of abscess of the orbit, which resisted the treatment until attention was directed to the teeth. An extraction of a badly decayed tooth (molar) was immediately followed by the escape of a large quantity of pus, and antiseptic treatment brought about a rapid amelioration of the orbital and ocular symptoms. De Schweinitz (14) mentions neuralgia of the fifth nerve as one of the exciting causes of Glaucoma in eyes predisposed to the disease. Personally I have seen one case of Glaucoma where I thought trifacial neuralgia was one of the exciting causes. Fox also says that dental pains and irritation of the Trigeminal nerve cause an increase of the intraocular tension, and often produces attacks of acute Glaucoma where there is a predisposition to neuralgia.

Wickerkiewicz reports the following observations: "Sometimes after the extraction of a diseased tooth gangrene of the

eyelids and orbital abscesses appear; the inflammation attacking the meninges, the patient dies, from meningitis in some cases, proving that thorough antisepsis should be observed even in the extraction of a tooth." Ulceration of the cornea from impaired nutrition may follow undue exposure as in Trigeminal Palsy. Also Neuro Paralytic Keratitis; this is a frequent result of paralysis of the ophthalmic division of the Trigeminal and follows frequently after an operation for removal of the Gasserian Ganglion. It may also occur in diseases of the Trigeminal without anæsthesia of the cornea, as pointed out by Jackson (15). The writer thinks that enough attention is not paid by the ophthalmologist to inflammation of the various branches of the fifth cranial nerve. That a great many headaches—the causes of which remain obscure—even after their errors of refraction have been corrected, and their eyes thoroughly examined, can be traced to the teeth. Often it is necessary to have the patient's blood examined to exclude malaria, anaemia, and syphilis. According to Lloyd (16) "Migrane or sick headache is a neurosis characterized by pain in the fifth nerve, by affections of the vision and by Gastric irritation. These three groups of symptoms may be said to constitute the tripod upon which the disease rests"

As far back as 1871, Anstie (17) boldly takes the position that Migrane is neuralgia of the Ophthalmic division of the Trigeminal and that, like the rest of the neuralgias, it is due to degenerative processes going on in the primary nucleus of the nerve. He finds his justification for this classification in the fact that no sharp line can be drawn between the complex form of migrane on which most of the descriptions have been based and to the localized neuralgic form. Even in the life of one individual the disease may change from one to the other of these types.

Putnam (18) says that Anstie's designation of Migrane as a form of trigeminal neuralgia is too narrow, yet signs and symptoms usually considered as indicating neuralgia are, to say the least, sometimes mixed in with those of migrane. To illustrate this point, the writer will cite a case of migraneous neuralgia which came under his observation and treatment.

Mrs. J. T., age 30, consulted me in April, 1907, for sick headache and neuralgia. She has had no children, and no mis-

carriages. Family history: Father and mother both living; health of each splendid. Has two sisters and two brothers, all in good health. Her father and mother, as far as she knew, had never suffered with headaches. Previous history: Has had measles, whooping cough when a child, and influenza four years ago, but has had no sickness of late except these attacks of sick headaches, which came on as near as she could tell about two years previously. They would come on periodically every three or six weeks. These headaches always affected the form of a hemicrania and the eye of the same side. They generally lasted about three to five days, and sometimes—but not always—wound up the attack by nausea and vomiting. After vomiting she would gradually improve. These vomiting spells would come on at the conclusion of the attack, whether she had eaten anything or not for the last twenty-four hours. Her general health was good, and she took lots of exercise and lived out of doors a great deal. She did not use her eyes much for close work, and she did not see why she should have so much trouble.

Status praesens: I found the right supra and infra orbital nerves very sore on pressure. Eyeball also sore to the touch. Ocular conjunctiva somewhat injected and considerable ocular pain. The pupils react well to light and her fundi were normal. Her muscle balance was very good. I found that her error of refraction was a cylinder—.50 at .90 in each eye. I gave her this prescription to be worn all the time, and also a capsule composed of Aspirin, arsenious acid and aconitine to be taken every four hours until she was relieved. Under this treatment she seemed to improve for a while. The headaches were not so frequent, and the nausea and vomiting were not so pronounced, but the supra and infra orbital nerves were still very sore to the touch. I asked her when she had consulted a dentist, and she said about two years ago. I made a superficial examination of the teeth and found her gums red, swollen and spongy. There was pus oozing out around the necks of several of the teeth. She had no toothache and no dental lesions as far as I could see, but she complained of an aching in and around the jaw bone, which she thought came from neuralgia in the eyes. I referred her to her dentist, who pronounced the case as one of stomatitis and pyorrhoea alveolaris. Under the prophylactic treatment of her

teeth and gums she made a splendid recovery. I saw her not long since, and she informed me that she only wears her glasses now for reading. This case was a combination of migraine and neuralgia, and I would call it migrainous neuralgia.

A neuralgic pain of peripheral origin is in all probability due to neuritis. One of the first things I do when a patient comes to me complaining of headaches over the frontal bone and radiating on to the temples, is to examine the supra and infra orbital branches of the fifth cranial nerve. If on pressure that nerve is sore to the touch, or if the patient winces—I know I am dealing with neuralgia or neuritis of the Trigeminal. Of course there are various causes for a neuralgia in this region of the head. Among them may be mentioned errors of refraction, errors of accommodation, errors of muscular balance, catarrhal conditions of the frontal sinus, anaemia, malaria, chlorosis, uric acid, rheumatism, excessive cold and heat, syphilis, traumatism and last, but not least, diseases of the teeth and gums. I always have a superficial look at the teeth when I am dealing with these cases. When you ask your patients when they have seen their dentist last, they say, "Not long since I had him look over my teeth—about six months or one year ago I consulted my dentist, I think." But when you pin them down, you will find it has been more like two or three years in a great many cases. The laity should be educated to consult their dentists at least every six months, and far better, every three months. It is true that a great many people have been educated along these lines, but there are thousands still to be enlightened on the subject.

The public must be made to realize what dental hygiene means and the benefits that will accrue to them before they manifest any great interest in the work.

Reber (19) in summing up his conclusions in his exhaustive paper on "Relations between ocular and dental diseases," has this to say,—among other things: "That the ophthalmologist should seek the assistance of the dental surgeon in all cases of unexplainable paralysis of accommodation, dilation of the pupil, palsy or spasm of the external ocular muscles, rebellious corneal ulcers, phlyctenular diseases, lachrymal fistula, orbital cellulitis, abscess, caries and periostitis and in threatening glaucoma, without apparent cause." Also Bull (20) states that "pain in the

teeth of the upper jaw is by no means an infrequent symptom in Iritis and Cyclitis," and he goes on to say that "toothache has been unmistakably recognized as one of the prodromal signs of Glaucoma."

Not very much is said in text books of ophthalmology in regard to Tic Douloureux or trifacial neuralgia. I think it certainly comes within the province of the ophthalmologist, unless removal of the gasserian ganglion is indicated, and in that event a general surgeon should be called in. Frazier (21), who has brought the subject up to date in a masterly and systematic way, says: "The treatment is either medical or operative, but before proceeding with any definite course of treatment, one should seek for a cause, and if possible remove it. Particularly in these cases which are of peripheral origin, may we hope to affect a cure by removing the source of irritation. It may be a carious tooth, a splinter of bone, a foreign body, a tumor, a catarrhal condition of the antrum the ethmoidal or frontal sinuses. At the onset at least, the treatment of all cases of trigeminal neuralgia belongs to the domain of medicine rather than surgery.

I have several cases in mind which I would like to cite, which I think tally well with Frazier's findings.

Case 1. Mrs. W. consulted me March, 1907; aged 34; married; no children; no miscarriage; no specific history; general health splendid, with the exception of the terrible attacks of neuralgia which almost drove her mad, as she expressed it. She complained of intense frontal headache, which seemed to radiate over the whole side of her face, including the teeth and gums of the upper and lower jaw. The supra and infra orbital nerves of the right side were very sensitive to pressure. In fact, she could hardly allow me to touch her on account of the "tender points." She was not able to read or sleep much at times, as the pain was so severe that she complained of not being able to see well, even at a distance. She gave a history of having had these attacks from time to time, but up to the present she had been partially relieved by phanacetine, antipyrine and quinine. The attacks came on sometimes in the night, while she was asleep, awaking her in the midst of a terrific spasm. I examined her eyes and found that she had one-half Diopter of hyperopic astigmatism in each eye with the rule. Her muscle balance was

normal; I gave her the prescription to correct her error of refraction, and some Warburg's tincture. She seemed to get along much better than she had before, and I thought she was on the road to recovery, when she came back in about four weeks with another attack. This time her face was red and spotted, showing vaso motor disturbances. She was in great pain, complicated with hysteria. I found it necessary to give her morphine hypodermically and dilated the pupils with homatropine in order to relieve the pain.

On account of the pain in the upper and lower jaws, I persuaded her to consult her dentist, although she insisted that her teeth were sound. The dentist found several lesions of the last two upper molar teeth on that side. He extracted the wisdom and the last molar was repaired. From that time on she began to improve. The neuralgia grew less. The soreness in the infra and supra orbital nerves gradually subsided, and in three months she said she felt like a new woman. I saw her six months ago, and she had no return of neuralgia, but she consults her dentist every three or six months, and has a prophylactic treatment of her teeth and gums.

Case 2. Mrs. B., of New Haven; age 25; consulted me four years ago for ocular pain and neuralgia in the side of the face and head. Her general health had been splendid up to these attacks. No children; no miscarriages; no specific trouble. At times she was in frightful agony. When in one of these spasms she would take acetanilid and phenacetine in large doses, combined with whiskey, which would deaden the pain, and then finally the attacks would wear off and would not return for several days, or sometimes a week. At the suggestion of a friend she consulted her local dentist before she came to me. He found no caries of the teeth and could see nothing wrong with them. When I first saw her I thought of Tic Douloureux, as her face was drawn on that side, which completely changed her expression. She said to me, "I never expect to get my face straight again." When I applied pressure over the super orbital nerve she fainted and was practically in a state of collapse. I gave her a hypodermic injection of morphine to control her suffering. I found her eyes about normal. One-half dioptré of hypermetropia. I saw it could not be her eyes that were at fault. I

advised her husband to consult a dental surgeon, which he did, and this is what he found: The wisdom tooth in the upper jaw wanted to come through. The jaw bone was too short, so that the crown of the wisdom tooth was turning outward and backward, and as he could not get at the wisdom tooth to extract it, he extracted the adjoining molar, which was absolutely perfect. The relief was almost instantaneous. The space in the jaw is now filled in by the wisdom tooth. That was four years ago, and the pain has never come back. But for surgical interference this woman could not have lived much longer, as she was practically exhausted by the pain and suffering.

According to Jelliffe (22) patients have had all their teeth extracted under the mistaken diagnosis of a dental disease, while some intractable facial neuralgias have been cured by proper attention to diseased teeth.

We come now to phlyctenular conjunctivitis and keratitis and ulcers of the cornea. These diseases are so frequently found in school children. The diagnosis is not difficult. We see them in the clinics every day, and a great many of them, with the red elevations on the conjunctiva, near the limbus, and sometimes these nodes or elevations extending over on to the cornea. The symptoms are: Pain, photophobia, with excessive lachrymation, and sometimes muco-purulent discharge. We see these children with *their heads in their laps and moss on their teeth*. These mild forms of the disease do well with local treatment, but when the cornea becomes involved it is more serious. The ulcer may heal rapidly, under proper treatment, and generally does, leaving behind a faint nebula, which sometimes disappears. Often, however, in spite of scientific treatment, we have an ulcer of the corner, which spreads in depth and width and frequently goes on to perforation, and the child is maimed for life. The cause of this trouble, a strumous diathesis, inherited syphilis, adenoid vegetation, disease of the teeth. It may also be due to want of proper food and proper hygiene.

According to Ball (23), "There is no general agreement as to the etiology of the disease." Of one thing we are sure. All Ophthalmologists know that in order to develop the phlyctenular process a suitable condition of the system must exist. In not a few cases this condition is brought on by diseases of the teeth.

Their digestion is bad, and they suffer from malnutrition and aneamia. Iron and codliver oil will not suffice to cure some of these children, who cannot chew their food properly and who are constantly swallowing bacteria, as a result of the condition of the teeth and dental caries.

According to J. E. Power (24), such men as Netter, Schriver, and other scientific investigators, have demonstrated that the dental pulp is a source of almost unlimited infection of vital parts of our system. Netter found that 10% of all mouths examined by him contained staphylococcus pyogenes aureus and staphylococcus pyogenes albus, and that the micro organism of pneumonia were present in 15% of healthy mouths. In these phlyctenular conditions I think the stomatologist can be of great service to the oculist, because I have seen them resist all kinds of medical treatment.

In the three cases which I have described to you to-night the organic lesion which produced the symptoms existed in the teeth and the signs were largely ocular. To illustrate the other side of the story, I will relate a case which came under the observation of Reber (25), which is most interesting. "A medical student, aged 24, enjoying good health, with obstinate dental neuralgia. A prominent dentist had pronounced the teeth all sound. For three months everything was tried. Arsenic, aconite, Gross neuralgia pills, dry and moist heat, and quinine in large doses, but without avail. He was the subject of considerable eye strain, and high exophoria (latent divergence). As he was of a very studious nature, 2° prism bases in were incorporated in the glasses he was wearing, and for ten years he has had no return of this dental neuralgia."

This case illustrates beautifully how irritation in one branch of the Trigeminal may give rise to symptoms in another branch.

CONCLUSIONS.

That diseases of the teeth should at all times be suspected as one of the causes of Tic Douloureux and migraine, is not surprising, from their situation and intimate connection with the fifth pair of nerves—which are more frequently affected with neuralgia than the other nerves.

The writer thinks that enough attention is not paid by the Ophthalmologists and Stomatologists to the inflammation of the various branches of the fifth cranial nerve. That the oculist should catechise more of his patients in regard to the condition of the teeth and gums, and especially when they come to him complaining of neuralgic pains in the head and face.

That pain referred to the distribution of the Ophthalmic or maxillary divisions of the Trigeminal should always lead to careful examination of eyeball as well as of the teeth.

The writer holds that supra orbital neuralgia of the periodical class is a form of migraine. That the thorough study of a case of sick headache or neuralgia is one of the most difficult problems of medicine.

That the differential diagnosis of Tic Douloureux, Migraine, and Hysteria is not always easy.

In a large percentage of persons whose headaches are without doubt due solely to eye strain and its associated local conditions the symptoms disappear promptly and permanently under correcting glasses. But in many others the results are disappointing. In this class of cases we must look to the teeth, the nose, sometimes the ear, and also for symptoms of latent sinus disease to help us out of the difficulty.

The writer wishes to point out the fact that the Ophthalmologist and the Stomatologist are frequently inter-dependent. and how important it is for both of them to be on the lookout in obscure cases for reflex neuroses, that may throw some light on the subject.

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THE ANATOMICAL DUMMY IN BRIDGE WORK.*

BY W. D. TRACY, D. D. S., NEW YORK, N. Y.

In discussing the merits of bridge work, the subjects of cleanliness and of anatomical outline have often been mentioned.

Many dentists of wide experience and mature judgment still maintain that a partial plate is superior to a fixed bridge. For the sake of brevity, however, let us grant that there are certain spaces in the mouth where a fixed bridge is not only permissible, but desirable.

Having planned the details of the abutments, the question arises as to how the space may best be filled. The old fashioned saddle arrangement had some virtue in that it permitted a fairly good restoration of the lingual surfaces of the dummy teeth, in the case of bicuspid and molars, but in most mouths it was an abomination, because of the accumulations that occurred beneath it.

The common custom of using a facing and a cusp, united with solder, and leaving a recess between the gum and the bridge on the lingual surface, is also objectionable. In the first place it is very difficult to keep clean, and secondly, the method gives very little opportunity for restoring the anatomical lines and leaves an unpleasant surface to the tongue.

To obtain a more correct outline for the dummy teeth, grind facings in the usual manner, back with pure gold, leaving the pins straight. Carve the gum slightly upon the model where the dummy is to come in contact with it, and build the dummies in wax.

Remove the facings and place small pieces of graphite in the pinholes. Take the dummy part of the bridge, as built up with the wax, and cast in coin gold. Having obtained this casting, it is united to the two abutments with solder. The small pieces of graphite are removed from the holes; the pins on the facings are threaded, and facings are cemented to place.

The bridge is then finished and polished, and if a reasonable

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amount of care and skill is used, a piece can be made that will not only be clean and strong, but which will very correctly reproduce the outlines of the missing teeth.

Cleanliness in the mouth seems to be largely a matter of temperament, but with this type of bridge the careful patient has no difficulty in threading the floss silk through the interdental spaces, and in dragging it over those ends of the dummies which are in contact with the gum.

The use of facings is mentioned, but any of the detachable post crowns may, by proper grinding, be used in this class of work where the bite will permit.

"PLASTER DIES FOR PORCELAIN INLAYS."*

BY E. B. PRENTISS, D. D. S., NEW YORK, N. Y.

Dr. Wheeler asked me to write on some very practical subject—some little thing which has been of great use to me in my own practice. It is, of course, the little things which are very often of the most importance to us in our work and I have chosen my subject because it describes one of those little things which has been of incalculable benefit to me for several years. When I first began to use porcelain I realized that the direct method of making inlays by burnishing the matrix into the cavity in the mouth was in many ways unsatisfactory and uncertain. We were either obliged to complete the baking at once, keeping the patient in the chair while the incomplete filling was reburnished in the cavity several times; or if platinum were used and the patient dismissed, to run the risk of its shrinking in the process of baking and not be able to reburnish.

Then, too, it was practically impossible for me to burnish a matrix properly in a labial cavity which extended under the gum. The impression method was tried and found successful right from the start. I was able, not only to obtain as good results, but better fillings than I had made before. Amalgam dies were used at first, but I soon found that just as good results could be obtained in nearly all cases with plaster. The method of making these plaster dies is no doubt familiar to a good many, but there may be others to whom it is new; and for their benefit I will describe in detail the process of making. In the first place, I take the impression with Detroit Impression Material either in cone-shaped sticks or in German silver trays, which are bent to fit each cavity; these impressions are filled with a special plaster on a glass slab so as to make a smooth, flat base. The plaster used for this purpose is "Ash's Superfine," which comes in small tin cans; it makes the hardest model of any plaster I know. As soon as it is set the model is trimmed to a suitable shape, taking care to keep it reasonably small, and as soon as

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hard enough the compound is warmed and removed. Then with a sharp knife the plaster is cut away so as to have a perfectly free and sharp edge all around the margin of the cavity. Now, here is where this method has an advantage over amalgam, for if time is a factor the entire die can be finished within an hour from the time the impression is procured. The model is placed on a wire gauze frame about six inches over a medium bunsen flame and all of the moisture driven off (this will require only about half an hour, but it can be left as long as desired). As soon as it is bone dry it is ready for stearinizing. I have found that the best way to do this is to have stearin (which can be obtained at any drug store) melted in the top part of an ordinary double boiler to the depth of one inch or slightly more, having water in the bottom boiler to keep the stearin from burning and discoloring. The plaster model is put in the top part of the boiler, which, together with the bottom water boiler, is placed over a good-sized burner and the water boiled till the stearin in the top part is melted and entirely covers the model. If it is left in this way for about two minutes all of the pores of the plaster will have become so thoroughly soaked that the model is made very hard; it should not be left in the melted stearin longer than that as it does no good and sometimes becomes discolored. When it is removed it should be done very quickly with a long pair of pliers and instantly blown very hard either with a blast of compressed air or with the breath held very close so that none of the stearin is allowed to remain in the cavity and harden. This is very important as the cavity would be decreased in size if any film of fat were to remain over the surface. As soon as the die is cool it is ready for making the filling. That these dies (some of which I have brought here and will pass around) are hard enough and tough enough to withstand all the necessary burnishing or swaging, will be evident to you when I say that each and every one of those shown here to-night is a practical case and has had a filling made in it. If you will examine the margins carefully (some of which are very thin and sharp) you will find that they have not been injured in the least by the process of trying in and re-burnishing, after partial baking, which is done in most cases three or four times before the inlay is finished.

I do not hold these dies up as a substitute for amalgam in all cases; for you see I have shown some made of amalgam for the especially large anterior corner approximal fillings and also a few for the labial cavities. (Those labial amalgam dies were made, however, for gold inlays.) I get no better results with the amalgam than with the plaster, however, unless in the very large anterior corners, such as the two found on the bottom row of the models passed around.

The saving in time is very great and in ninety per cent. of the fillings I make the amalgam possesses no advantage over the plaster when handled as I have described.

With reasonable care in burnishing they will be found to be sufficiently strong for practically all porcelain work, and when the very simple apparatus is supplied for making them, will be found to be very easily and quickly made.

During the last five or six years I have not burnished a single matrix in the mouth and have used the plaster dies, as I have said before, for more than ninety per cent. of my porcelain fillings. Almost never have I had to make over a filling on account of a poor fit, and then only when the filling fit the die as poorly as it did the cavity in the mouth, due, of course, to faulty burnishing during the process of baking, or in trying to bake it with too few re-burnishings.

I fully appreciate the honor of being asked to read this little paper here to-night and sincerely hope that the process it describes may be as useful to someone else as it has been to me.

THE TECHNIQUE OF MAKING JACKSON APPLIANCES WITH PRECIOUS METALS.*

BY C. W. B. WHEELER, D. D. S., NEW YORK, N. Y.

The advantage of orthodontic appliances made of precious metals, over those of German silver has been pretty thoroughly gone over in the last two or three years and there are many points in regard to both metals on which we do not all agree as yet.

It is not my intention to touch on this question, but to simply put before you the method I follow of making the Jackson appliance of gold and platinum. I have found many men that use this form of appliance that have told me that if they could get rid of the base metals, it would eliminate one of the worst features.

In my own practice when an expansion arch is used, it is made of gold and platinum, and within the last year I have endeavored to change most of the Jackson appliances so that they would be made of the same.

Tin or soft solder used in connection with German silver in the mouth disintegrates and becomes fine dust when touched with the soldering iron in making a repair. This is very marked at the point where the attachments are made between the German silver partial clasps and the different wires, and it is always necessary to scrape the parts and cut away this portion of the tin before trying to solder. This disintegration causes the wires to loosen and creases and cracks to form, thus allowing the food and secretions of the mouth to work into the appliance. To overcome this last trouble, I have advocated the boiling of the appliances in a solution of carbonate of soda, then washing and polishing.

Hard solder being stronger than the tin, it allows of our making the appliance much less bulky, and at the same time gives strength enough so that we may bend without fear of breaking.

Casting of the appliances, either in whole or part, I have found unsatisfactory, as it does not seem possible to get the

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same adaption of the partial clasps as can be obtained by making each separate and fitting to the teeth.

In the making of gold appliances, I follow closely the technique of Dr. Jackson in making the regular appliance with the exception of the length of wires extending into the body of the appliance, and the manner of soldering.

The partial clasps are made of platinized gold, gage 36, and I have used the strips of band metal which can be obtained from the dental depots for this purpose, getting the width which is used for molars, and having it rolled down to the desired thickness.

The spring clasps are made in the usual way, being held in place by pins or moldine, but it is necessary to let the ends extend but a short distance over the partial clasps. This is also the case with the base-wire, either flattening or grinding down the short ends that extend into the solder.

A small wire should be allowed to extend through the body of the appliance, and this may be an extension of one of the finger or other springs with which the appliance is equipped. The wire used is the same as that used for expansion arches.

After all the parts of the appliance are in place and held firmly on the model, they are tacked with small pieces of 22 karat solder, using an orthodontic blow pipe, or one that will give a very small pointed flame.

After the parts have been securely tacked together, the pins, or other material that has been used to hold the parts in place may be taken away, and the skeleton appliance carefully removed from the model. Should there be an undercut, not allowing of its removal without springing, water may be dropped on the teeth and they will then crumble owing to the heat that has been applied in soldering. This skeleton appliance can be then built up and rounded out with wax, invested in some investing material, and 22 karat solder flowed in.

The repairing is very simple, and in most instances it is not necessary to invest. If a spring clasp breaks, a short portion of gold tubing may be slipped over each end of the wire, and then with a small piece of 22 karat solder a very strong mend may be obtained. If it occurs at a bend in the wire, the two ends may be brought together and after winding them with a very thin narrow strip of gold, a little solder may be flowed over all. It is then dressed down and polished.

FRACTURED AND IMPAIRED ROOTS.*

BY J. B. LOCHERTY, D. D. S., NEW YORK, N. Y.

Of course, we are all aware that if patients could be under the observation of the dentist from the first period of dentition, many conditions could be improved or corrected, which would in later years save not only much suffering and trouble, but expense as well, and also prevent the possible loss of many valuable teeth. Fortunately, fractured teeth are among the least contributing causes to this condition, but notwithstanding this fact they are no less important and require the same great care and thought that is bestowed upon all other branches of our life's work. As to the causes of fractured teeth, they may be divided into three classes generally speaking. The first and most important because they are the more frequently met with—are those conditions wherein either a large cavity or filling is a contributing cause, which by the aid of some foreign hard substance causes a section of the tooth, especially when it projects beyond or above the filling to be split or fractured. The extent of the fracture depending on the thickness of the wall of the tooth and root and pressure brought to bear. Should the fracture extend below the cervical portion of the crown proper into the roots, it would depend largely as to the real extent of the fracture, and the probable future usefulness of the member, as to the best method to employ to preserve it. It would generally seem a wise course, especially where the fracture does not extend very far below the cervical portion of the tooth, to remove the so-called splinter of the tooth instead of banding, for by so doing, especially with the modern methods used in restoration, a more permanent and useful tooth may be restored.

In the second class may be mentioned those instances where the cusps of teeth are unusually well developed or prominent, which when partly worn down by attrition or erosion may become fractured by undue pressure. The third is accidental.

As fractures when fillings are contributing causes, it may

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be said that in many instances the condition might have been avoided had the walls of the tooth been so trimmed as to permit a filling or inlay to rest upon the occlusal or grinding surface, thus protecting the edges, or else by thoroughly reinforcing the walls by cements, etc. Certainly many teeth are not unfrequently fractured where had this precaution been taken originally, it would not have occurred. It is however, with the fractured condition that we are now dealing and the technique in restoring it. Pressing the gum tissue back with gutta percha if necessary, sufficiently so as to take a clear perfect impression of the part which is to be restored, is the first step. I find the green inlay wax to be the most suitable for this purpose because it will not draw when chilled but requires little pressure to get a perfect impression. It is thoroughly oiled with a thin fin oil and invested in plaster, from which model the inlay is made.* This method is far superior to the older method of burnishing a piece of gold or platinum matrix to the root direct, and then building up with solder, and it is superior to restoring the root by the aid of a temporary band and filling it with alloy, and less painful. There are of course, conditions present where it is advisable to band the fractured parts together; especially is this indicated where roots are separated by the fracture and require to be brought tightly together for mutual support. The most prominent example being that of an upper bicuspid, or perhaps a lower molar. Providing the disintegration does not extend to the bifurcation. Then it is questionable in lower molar roots. In this case, banding or crowning separately might be advisable. As regards fractured or impaired roots, especially when the cause is due to an attached crown, where the post either has insufficient strength or else does not closely or properly fit the root canal, we have sometimes a more difficult problem to face, especially if the break is a very deep one. In this instance, if there is considerable sound dentine present, it may be successfully banded, then crowned, or may be built up in the regular way, after removing the splintered portion where indicated.

Cement fillings on the margin of or below the cervical portion of a tooth or root, will invariably disintegrate with the usual serious consequences. Fortunately such forms of medieval dentistry are fast passing away. I recall the case of a Mr. W.

B. having a fractured lower molar. Upon examination it was found that the distal root was fractured cross section below the bifucation. After the removal of this root, the remaining splintered portion was cut away up to the bifucation and the remaining anterior root crowned. Other instances are occasionally brought to the attention of all of us where isolated roots of a molar, either by disease or absorption of the process may have to be removed, leaving the remaining roots of the tooth after proper preparation serviceable for years.

A patient, a lad of eleven, had the misfortune two years ago last June to fracture his superior central incisors, approximal mesially to an extent not sufficient, however, to expose or cause the death of the pulps. After a careful examination, and polishing the rough edges and cautioning him against affecting them, by thermol changes, etc., nothing else was done, except to watch them at stated intervals. The conditions are improving and no doubt eventually porcelain inlays may be inserted when he is in his teens and the teeth have become sufficiently strengthened to permit it.

Fortunately fractured teeth are not commonly met with in our daily practice, but the very nature of our work trains us to give the closest scrutiny to every detail of our science.

CAST RESTORATIONS.*

BY MARTIN CHARLES TRACY, D. M. D., NEW YORK, N. Y.

In presenting the subject of cast restorations, I can hardly expect to enlighten such a progressive and experienced body of men as you who have honored me. We may, however, gain some mutual benefit by considering the subject together.

In the chronicles of dental evolution, the 15th of January, 1907, stands out as marking the beginning of the most important era in the history of modern dentistry, when Dr. William H. Taggart, of Chicago, appeared before the Odontological Society of New York and made the first public practical demonstration involving the casting of a pure gold inlay.

To Dr. Taggart the whole world owes a debt of gratitude, and because of his great genius and inventive skill we, as a profession, can claim an advancement perhaps second to no other branch of medicine.

We have the deepest respect and admiration for the men who have made almost perfect foil fillings, restoring beautiful cusps, and definite points of contact, but the men who have been able to do this well, I am compelled to believe, are few, and I am inclined to pity the dentist who limits his efforts to these methods, in the light of our present new and better way. My sympathy also goes out to the patient who is asked to submit to an unnecessary and most unpleasant operation.

I am reminded of the stone-crusher one sees along the country highways in England. The old man sits by his heap of stone, and with his hammer reduces each stone to the proper size for filling in the road bed. It is a slow and laborious process, even though the results are excellent.

By no means, however, have we discarded our Gold Pluggers, nor do we intend to eliminate them from our daily practice. Gold foil has, and no doubt always will have, a very important place as a filling material, though in a much more limited field than in former years.

*Read before the American Academy of Dental Science, Boston, Mass., January 4, 1911.

We still continue the use of soft gold, tin foil and cohesive gold, and in the introduction of the latter, I, personally, prefer the good old means of hand pressure and the use of the hand mallett.

It is true the personal equation plays quite as important a part in cavity preparation and in the construction of cast restorations as in any other dental operation, but I venture to say, less harm will be done at the hands of the unskilled or even careless operator, in this method than in the old way.

"Be not the first by whom the new are tried, nor yet the last to lay the old aside."

COMPARATIVE VIRTUES.

The advent of the casting process in dentistry has reduced the time required of the patient to a minimum. Where, heretofore, he has necessarily spent hours of his more or less valuable time in the dentist's chair, he is obliged now to remain only for the preparatory work and returns later for the restoration constructed during the interim. To the busy professional or business man this time-saving feature is especially attractive. To the nervous, delicate woman, to the invalid or refractory patient, it is a "God send." To the dentist who spends his entire day in such close proximity to his patient, working in a field where almost every disease in one way or another manifests itself; where he necessarily fills his lungs over and over again with the air his patient breathes out to him, the advantages are most obvious.

A much broader field of usefulness presents itself to the dentist who can utilize the services of skilled assistants in the laboratory. He also has possibilities of materially increasing his income.

The dread of the dentist's chair has long been an established sensation, wherever such an institution has existed. This fear of having pain inflicted, even at the hands of one whose province it is to relieve and prevent pain, has caused many a one to neglect the care of the teeth until driven by despair and long suffering.

The office of the so-called painless dentist has been filled to overflowing with patients eager to pay their money and not be hurt. It is the cry of the rich and poor alike, the educated

and the uneducated, and while they come from these institutions of unprecedented falsifying and corruption, more ready to believe in the virtues of honest dentistry, there comes also an undeniable stimulus to us to strive to make our work less painful, and less dreaded by our patients.

The gold inlay does not make it possible for us to practice painless dentistry, but it has so simplified the arduous nerve-racking operations of filling large cavities that, as Dr. Ottengui has said, it comes nearer than any other system to this ideal, and had the process no other virtue, it must be heralded as a splendid advancement.

OCCLUSION.

Normal occlusion, as defined by Dr. E. H. Angle, is "the normal relation of the occlusal inclined planes of the teeth when the jaws are closed," and is recognized by all scientific students of dentistry as the standard to which all restorative dental operations should lead. All efforts in the past to establish approximal and occlusal contact by the use of gold foil have been more or less guess work. First the inconvenience of making a liberal separation between the teeth, then the process of building in the gold, piece by piece until there is a sufficient excess to be ground and filed and polished into the form required. A large restoration made in this way, the gold being properly condensed and the anatomy of the lost tooth structure being normally reproduced, is without doubt a work of art and worthy of the highest credit.

The careful mechanic has been able to swage occlusal surfaces for individual crowns and bridge pieces, which are almost beyond adverse criticism.

I am more than ever convinced, however, that the time has come when we should all be workers in wax. Who will choose to stand at his chair and hammer in gold, when he can make perfect fillings in wax and reproduce them in pure gold? Who will attempt to swage occlusal surfaces for crowns and bridges, and construct with solder, when the whole can be carved anatomically correct in wax and reproduced in coin gold or gold of any kareet desired?

WHERE THE GOLD INLAY IS INDICATED.

Without reservation I have no hesitancy in recommending the cast gold inlay as the most practical filling for all large approximal cavities in the molar and bicuspid region.

In occlusal or other surfaces in this field not easily accessible and quickly filled with foil, the gold inlay meets the requirements and in every way simplifies the operation.

Often the distal surfaces of cuspides and even large cavities in the incisal region where appearances must be sacrificed for strength may be accurately restored in this way.

In short, I believe wherever a large gold restoration is indicated, a cast gold inlay is indicated.

CAVITY PREPARATIONS.

If there is any one phase more important than another in the process of restoring lost tooth structure it is cavity preparation. This is particularly true in restorations made by the use of the gold inlay; indeed, I believe more failures are due to faulty cavity preparation than to any other one cause.

The principles of "Extention for prevention," laid down by Dr. G. V. Black, for all metal fillings, are generally conceded to be scientifically correct, and, in the main, these principles apply in the preparation for cast fillings.

Firm flat seats and nearly parallel walls are the two imperative features to be carried out in cavity preparation, the cavo surface angle being liberally beveled to protect the enamel rods from the stress of mastication.

It is universally accepted that a flat foundation is the most secure foundation to resist any force directed upon it. It, therefore, follows, that the cavity should be so prepared that when the inlay is sent home, it be so seated on flat surfaces as to best resist all the forces of mastication.

I believe, with Dr. Conzett, that a cavity properly prepared for foil is very nearly, if not quite, prepared to receive a gold inlay.

Cavity formation is best accomplished in my hands first by the use of sharp chisels for breaking down frail walls and generally outlining the cavity. Sometimes by gently tapping

the chisel with a hand mallett the walls may be quickly reduced with very little inconvenience to the patient.

The soft decay is removed with sharp spoon excavators after an application of pure carbolic acid followed by hot air. Then with small, keen-cutting stones and special ivory cross cut inlay burs, the seats and lines of the cavity are formed. Cement is often necessary for filling undercuts and replacing dentine in large cavities.

The direct method of making the wax model in the mouth seems to be the most universally accepted. In my hands, however, the indirect system—that is taking, an impression of the cavity and making an amalgam die, has taken precedence.

The impression is taken in Detroit compound, using the Roach inlay tray for the individual case to confine the compound and force it home. Care must be taken not to over-heat the impression material. After softening the end of a stick of compound above the flame, *not in the flame*, a piece the size of a bean is cut off and rolled into a ball, the tray is slightly warmed and the ball is placed into it, making the surface smooth and free from wrinkles. After cooling the surface of the compound it is softened over the flame, a small amount of vaseline smeared over the cavity and the compound forced home with a firm hand.

Upon cooling with a stream of cold water, the impression is removed and we have a clear, perfect imprint of the cavity. The impression goes to the laboratory, where it is gently forced into soft plaster in a plaster mould made for the purpose. While the plaster is setting the amalgam may be mixed. We use the S. S. White's quick-setting True Dentalloy, the mixing being done by means of the Leaming amalgam mixer in the dental engine.

The amalgam is at first used rather soft and is pressed or burnished over the surface of the impression. The remainder being built in with more and more pressure, absorbing the excess mercury from time to time until the whole cavity is filled.

With the duplex plaster mould, devised by Dr. F. E. Jones, several impressions may be nicely filled with one mix of amalgam. The amalgam is allowed to set from three to six hours, or if convenient, over night, when the mould is opened and a groove

cut in the plaster; with a stiff knife the plaster is separated and the die released.

The amalgam die or mould is trimmed and carefully placed in a wax bite, a cross being cut in the under side to clearly show its position in the plaster cast. When this is poured up in plaster in an inlay articulator and separated, we have an accurate reproduction of the cavity in an amalgam tooth with the approximal and occluding teeth in plaster. A thin coating of vaseline or sweet oil is smeared over the cavity to assure easy removal of the wax.

It is now a simple matter to construct the wax filling, building out approximately and occlusally at will. The amalgam tooth may be removed from the plaster cast while the wax is being carved and replaced from time to time until perfected.

Most careful attention should be given to the contour of the wax filling, for no matter how accurately the inlay may fit the cavity, if the mesio-distal diameter of the tooth be not properly restored the filling is a failure.

In handling the wax inlay it is well to remember that it is much easier to carve and polish wax than it is of carve and polish gold, consequently the wax inlay should be made as nearly perfect as possible. To those who use the indirect or impression method, this carving can be readily done while the wax is still in the amalgam die. Those who prefer to use the direct method will find it convenient to do the final carving after the wax inlay is attached to the sprue former. Care should be taken, however, to see that the sprue former is fairly well imbedded in the wax, so that it will withstand the force used in carving.

After this carving is completed to the satisfaction of the operator, the wax should be thoroughly polished. For this purpose some use vaseline, but this is not so good as the Oil of Cajeput, which has been selected by Dr. Taggart for this purpose, after experimenting with many other solvents of wax. The Cajeput is just sufficiently solvent to nicely smooth up the surface of the wax without making it soft and "messy." The Cajeput should be followed by a liberal cleaning with alcohol, used either with a cotton swab or a camel's hair brush. If care is taken in this work and the subsequent steps, the casting will come out with very smooth surfaces.

INVESTMENT AND CASTING.

The investment material should be mixed in absolutely the same proportions every time, as in no other way can exact results be expected. At a recent meeting in New York before the Second District Dental Society, Dr. Taggart exhibited his new investment material, which is so slow setting that the operator has from seven to eight minutes in which to manipulate the material so as to get out all air bubbles, and even then it is poured as thin as milk. It is very desirable, as it lessens a chance of producing rough castings.

In regard to casting, much discussion has been published in our current literature, some advocating casting into hot moulds, and some claiming that the moulds should be as cold as possible. A very convincing test of this matter was made recently in Dr. Ottengui's office. A casting had been made in a hot mould and the inlay came out with three lines of "feathers" on it. Dr. Taggart was present and claimed that this was due to overheating and splitting the mould. Another mould was being heated up at the time, and upon examination it was found that this had already showed three conspicuous crevices. On the advice of Dr. Taggart this mould was set aside entirely cold, and then it was impossible to find the cracks even with a magnifying glass. A cast was made into this mould which was known to be cracked, and it came out perfect and without any signs of "feathers." Moreover, this casting made in a cold mould accurately fitted the cavity, whereas the other, which had been cast into a hot mould, was too large to be used.

In order to really cast into a cold mould it is necessary to use as small a flame as possible, so that the flame will play upon the gold only, and thus not overheat the investment. In order to show that this may be successfully done even with large castings, Dr. Ottengui subsequently cast an inlay weighing $6\frac{1}{2}$ dwt., and this dropped accurately into place without touching the cav-surface of the inlay. This seems conclusive evidence that even if there is expansion and contraction, that the slight heating which the mould received in this way probably expands the mould very nearly to the same extent as the expansion of the gold inlay's molten condition, and that both contract about

equally; when cold again the mould is restored to its original form and size and consequently the gold inlay fits the cavity.

FINISHING.

The proper finishing of a gold inlay before and after it is placed in position is a feature as important as any step in its construction and is far too often neglected.

If the carving and casting have been properly done, very little if any grinding with finishing burrs or stones will be required. If grinding becomes necessary it may be very neatly and smoothly done by means of the little Leaming mounted finishing stones constructed of carborundum and rubber, or with Miller's carborundum points. Either of these are made in fine grit and can be used on enamel or gold with very little friction.

For making the surfaces of the inlay perfectly smooth I have found nothing so effective as a flexible rubber disk, called Den's Disk. When moistened it works quickly and leaves a uniformly smooth surface. Incidentally this disk is of very great value in finishing amalgam fillings.

The final polishing is accomplished by means of fine pumice-stone and a wheel brush in the engine. Some operators prefer to burnish the surface of the inlay after the final polishing.

No better compliment can be paid to an operator's skill than to mistake his large foil filling for one of these finished cast gold inlays.

The casting of gold for dental restoration is in its infancy. Grave failures have been made and will continue to be made, always by the ignorant and careless, sometimes by the most careful and competent, but in my opinion the principle will remain sound.

"How many things by season season'd are
To their right praise and true perfection!"

THE NEW YORK INSTITUTE OF STOMATOLOGY.

Your Committee on Research respectfully report that Prof. William J. Gies of the Department of Biological Chemistry in Columbia University has prepared the following plan of study of dental caries, and possibly of other diseases of the teeth, for this season's work. We wish to express our thanks and appreciation to both Prof. Gies and Dr. Lathrop for the interest they have taken in our problems.

ARTHUR H. MERRITT,
J. MORGAN HOWE,

November 1st, 1910.

Chairman.

A proposed plan for the immediate continuation of the study of dental caries, under the auspices of The New York Institute of Stomatology, by Alfred P. Lothrop and William J. Gies, in the Laboratory of Biological Chemistry of Columbia University, at the College of Physicians and Surgeons, New York.

General chemical study of saliva in typical cases of dental caries and in cases of comparative immunity to decay has failed to reveal significant chemical relationships. These negative results have led to the conclusion that if any salivary compounds cause decay, they must occur in saliva in proportions that are too minute at any moment for their chemical detection under the variable conditions of salivary secretion. It also seems probable that if such substances are continuously produced in very slight proportions during a long period of time they may be cumulatively effective and sufficiently corrosive to disintegrate and puncture enamel. Such insidious changes could occur in and under the ordinary viscid and tenacious plaque formations, which, by affording a favorable ground for the lodgement and development of bacteria, might be seats of continuous chemical action by small perhaps infinitesimal proportions of bacterially produced enamel-destroying compounds (e. g., acids from carbohydrates).

Disregarding for the present certain possible relationships between decay of teeth and systemic conditions, it is proposed to attack the problem in the second phase of its study along the following main lines (I-VII).

I. Ascertain the most favorable conditions for the growth and cultivation of bacteria connected directly or indirectly with the leading types of dental decay.

II. Determine the nature and relative quantities of the significant substances produced by such bacteria (I) in the following media :

(1) Normal saliva.

(2) Mucin solutions.

(3) Saliva containing dissolved or suspended carbohydrates, fat protein and other food proteins.

(4) Mucin solutions containing dissolved or suspended carbohydrate, fat, protein and other food products.

(5) Common food masses subjected to ordinary mastication.

(6) Suspension of particles taken from the teeth after the completion of an ordinary meal.

(7) Solutions of food acids and alkalies associated with various common nutrients.

(8) Suspension of powdered enamel in nutrient liquids.

(9) Suspension of powdered dentine in nutrient liquids.

III. Determine the solvent action of the important bacterial products (II) on the enamel and dentin of natural (extracted) teeth, for the purpose of identifying the most destructive agents.

IV. Establish the chemical and physico-chemical nature of so-called mucin, in order to obtain a better understanding of its possible chemical and physical influence in plaque formation.

V. Learn the physical and chemical conditions of "plaque" formation, from chemical and bacteriological studies of plaque scrapings as well as of artificial plaque cultures, by the "lamb broth method" and other processes.

VI. Study the action of food acids on the enamel and dentin of natural (extracted) teeth.

VII. Find suitable agents for the disorganization of existent plaques on tooth surfaces and for the possible prevention of plaque formation.

The foregoing plan presents merely a provisional working program and is open to immediate revision, as new facts and further knowledge afford a better understanding of the situation.

October 31, 1910.

ALFRED P. LATHROP,
WILLIAM J. GIES.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held at the Academy of Medicine, Tuesday evening, October 4th, 1910.

The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

The minutes of the last regular meeting were read and approved.

The President—It is to be hoped, gentlemen, that returning from our vacations, we have brought with us a lot of renewed energy and strength, that we are willing to use for the advancement of this Society, of which we are so fond. The Institute is something more than a dental society, for we have a special mission, being one of six societies interested in the publication of the Journal of the Allied Societies—a professional journal, controlled by dentists.

The announcement for this evening's meeting has upon it a special notice calling attention to the hour of opening—eight o'clock—and it is the intention of this administration to open meetings at eight o'clock precisely. New York City is rapidly becoming almost impossible as a place of residence, being merely suitable for the transaction of business. The consequence is that many of our most prominent members are now commuters, who who have formed the habit of running for trains. As we wish their attention and help, we will make what time we can by beginning promptly.

Dr. H. L. Wheeler—It gives me great pleasure to announce that the Board of Directors of Bellevue Hospital have voted to appoint a dental interne, on the same basis as a medical interne, to attend to the various dental necessities that will arise in that large institution.

This, it seems to me, is a decided step in advance, and of great advantage to all branches of the medical profession. What is needed there is a young man who is willing to spend another year after graduating and passing the State Board, in obtaining experience, and if any member of the Institute knows of a young man who would like to round out his college experience with a year in a hospital, where he will be in close contact with his

brethren of the medical fraternity and in which he will be on duty through the regular hours at the dental ward, I will be very glad to meet that young man, and put him in touch with the Board of Trustees.

This thing has been brought about by the very loyal and self-sacrificing attitude of twenty or thirty young men who have given their time unstintingly to carry on the work of the dental profession in Bellevue Hospital for nearly two years now. There has also been a dental department established at Harlem Hospital, and it is only a matter of time when Fordham and Gouverneur Hospitals will also have one. This it seems to me is a practical beginning for such members of the dental profession as wish to ally themselves with their colleagues, the physicians, in the matter of charitable work to the needy poor. The hospitals probably offer the best means of doing that which we have at our command at the present time, and the fact that those in control realize the value of mouth attention, and are willing to do what Bellevue has done, is a very hopeful sign.

Also we have secured through the interest of Dr. Maxwell, Superintendent of Schools, from the Board of Education, the privilege of entering twelve of the public schools and making examinations of the condition of the mouths and teeth of the children in those schools. This has been done in order to secure the expert opinion of dentists as to the conditions obtaining in the mouths of the public school children, and I will be glad to receive the names of those who are willing to volunteer for this work.

We have had printed over 100,000 diagrams, and a diagram should be made out in triplicate; I would be glad to furnish the necessary diagrams to any one who wishes to assist in this work.

When the statistics are obtainable from dentists, then the Board of Education stands ready to consider the question of what to do in the matter of appointing dentists to attend the school children, and the Board of Health is also in sympathy with us.

A committee of three dentists has been appointed, of which Dr. Karl C. Smith is chairman, to work in harmony and consult with the Health Commissioner on matters pertaining to the teeth of the public; and the Board of Health also stands ready, as soon

as it can be proved practicable, to recommend that dentists be appointed on the Board of Health to do the examining in the schools instead of the physicians or school nurses.

Any assistance the Institute may give to this work will be appreciated by those who have been carrying on these labors; and we will be contributing toward a cause that will put dentistry on a better footing with the public than it ever has been.

The President—Does Dr. Karl Smith wish to add anything to what Dr. Wheeler, has said?

Dr. Karl C. Smith—I have nothing special to add to Dr. Wheeler's statement. I have had some consultation with the President of the Board of Health, along these lines; but the gist of the conversation has been given by Dr. Wheeler.

The President—Since our last meeting, we have lost two members by death. Dr. Milton B. Straight, a prominent dentist of Buffalo, well known for his earnestness and skill, a member of this society for a number of years, died about the middle of June.

The other one was one who has done so much for this organization from its beginning that his place can never be fully filled. Dr. Albert H. Brockway, of Brooklyn. I requested Dr. E. A. Bogue, a close friend of Dr. Brockway's, to prepare a minute upon his life and work, which will now be presented.

Dr. E. A. Bogue—Mr. President and Gentlemen—Since our last meeting another of our charter members, and one whom we all held in affectionate regard, has passed away.

As you have honored me with the request that I would, as one of his old time friends, prepare a little minute of his life and work. I beg to submit the following:

Dr. Albert Hamilton Brockway was born in Bridgewater, N. Y., on August 22nd, 1829, of Quaker parentage.

He was educated in the public schools of Syracuse and Rochester, also at the Rochester Collegiate Institute, and at Rutgers College.

He received his professional training under Dr. Newell of New Brunswick, Dr. Westcott of Syracuse, and Dr. Swartwont of Utica.

In 1857 he became associated with Dr. Rush McGregor, of Rochester, and practiced there.

Two years later he went to Chittenango, and in 1862 he removed to Brooklyn where he continued until his death.

Dr. Brockway was for some years a clinical lecturer in the New York College of Dentistry, the Pennsylvania College of Dentistry, and the Philadelphia Dental College, and was a member of the Board of Visitors of the Baltimore Dental College.

He was also a member and several times President of the Brooklyn Dental Society, and was a member of the Second District Dental Society, the New York Odontological Society of which he was President in 1892-3, and was a member of the American Dental Association, The New York Institute of Stomatology, and the Ninth International Medical Congress.

Finally, such was the affection and respect in which he was held by The New York Institute of Stomatology that he was elected in 1901 to the Vice-Presidency of that body, and in 1903 became its President. This was the last office that he held among his professional brethren.

He was married in 1861 to Miss Ellen Tiffany, and is survived by her and one son, Robert Ormiston Brockway, a physician.

Dr. Brockway died on June 20th, 1910.

As a dentist, Dr. Brockway commanded the respect of his professional associates for his operations, which were performed with conscientious exactitude.

His demeanor toward friends served to attach them to him and his counsels were always, so far as possible, in the direction of peace. In the words of a distinguished preacher, he was religious as every wholesome and sane man is religious. His religion needed no vindication, for his work and his life were given to exemplifying that the whole duty of man to God and his fellows is to live and to serve.

There can be no argument against such religion; it does not admit of scepticism; it is Nature itself, and needs but to be seen to be grasped and to be believed.

This is the essence of a wholesome, normal life,—a life that must bring peace.

We take leave of our friend and fellow practitioner, conscious of his sterling worth, conscious of his modesty, and mindful of his quiet and unostentatious performance of his duties,

which has left behind an example fitter by far to be emulated than that of many a one whose course has been more conspicuous.

We shall miss his kindly presence at our meeting, and we beg to offer to his family our appreciation of those qualities which have endeared him to us.

"Most men will proclaim every one his own goodness; but a faithful man who can find"?

The President—We are under obligation to Dr. Bogue for preparing this beautiful tribute to our old friend, Dr. Brockway. It will appear in our published proceedings, and a copy will be sent to his family.

The President introduced Dr. C. F. C. Mehlig, who showed some of the possibilities of the casting process. A short recess was taken to permit those present to examine the casts and specimens presented by Dr. Mehlig.

Dr. George Huston Bell then read the paper of the evening, entitled: "Ocular Manifestations of the Peripheral Affections of the Fifth Cranial Nerve." (For Dr. Bell's paper, see page 6).

The President—Gentlemen, this carefully prepared paper on a subject very important to dentists and ophthalmologists is before us for discussion. The discussion will be opened by Dr. J. Herbert Claiborne.

Dr. J. Herbert Claiborne—Mr. President, and gentlemen: Until I read the paper of Dr. Bell, I am free to say my views on this subject were glitteringly general. After reading his paper, they have become individually specific. From what Dr. Bell has said, I might almost conclude that the majority of the diseases of the eye are dependent on the teeth.

When we reflect that the trigeminal nerves supplies the eye and the teeth, and in fact the whole upper part of the face, except the ear, we must recognize the dictum of science that an irritation in one part of a nerve may be referred to its different parts, so that pain in the distribution of the trigeminal which affects the teeth may very readily affect the eyes. That would be a logical conclusion from the conclusions of physiology, and it is evidenced and proven by clinical fact.

It seems to me that stomatologists hold the gateway to our physiological functions—to our entire life. It has been long recognized that assimilation is the very essence and the beginning

of our strength. Without food we cannot live. Unless we digest that food we cannot have strength, and strength is necessary to life. It is clear that unless we bring our food to the condition known as a poultaceous mass, until it can be reduced to such condition that the digestive fluids of the stomach and intestines can act upon it, we cannot have life or strength.

Nature knows her business. She has made us with the teeth of the rodent,—to nip; with the lacerators of the dog and the carnivorous animals to tear and with the grinders of the graminivorous. We therefore fulfil the purpose of Nature in all of her animal creation, and this has been beautifully referred to by a number of the classics.

We must have good teeth in order to be strong, if we are to be such men as we hope to be, and as we have been in the past. Eliminate the teeth, and we must fall back upon pap, and pap is a food for babies. It is the noble purpose of you gentlemen to preserve our teeth for us.

It appears to me that ophthalmology and stomatology are allied. This great nerve, the trigeminal, binds us together with indissoluble bands.

Dr. Bell has set forth views which I have held in a temporizing kind of way for years, but I had not the faintest idea that the literature on the subject was so extensive as he has shown it to be.

I have recognized that inflammation of the antrum which some times arises from a wisdom tooth trying to erupt, will cause pain on the side of the face, giving the symptoms of a migraine or hemi-cranial; but it never occurred to me before that it is possible to relieve certain forms of migraine by examination and treatment of the teeth. Having had a great many cases of pain over the supra-orbital nerve, I am accustomed to press upon that nerve in cases of headache to find out if there is any tenderness there, and if there is, I say there is neuritis. I have never yet pressed upon the inferior orbital nerve, but from this time on it will be my practice to do so, to test the validity of this gentleman's contention.

Dr. Bell has mentioned conjunctivitis, and a variety of conditions as possibly arising from irritation of the teeth but I will frankly say that I have never seen them. All I can say is that I have known of wandering pains passing over the face, the

brow and the eye which have been relieved by the treatment of the teeth. I therefore cannot accept from the standpoint of experience, that all these conditions may arise from caries of the teeth; but I do not deny it, and in the future it will be my pleasure to try to prove the points which have been set forth this evening.

I do know that glaucoma will produce symptoms which may in a measure be referable to the teeth, and that it is associated with pain running down the nose and along the jaw. I have also known dilatation of the pupil to come from a carious tooth.

Dr. Bell cited a number of cases in which he found a half degree of astigmatism, or hypermetropia; and having corrected that, has sent such patients to a stomatologist. After the correction of the tooth trouble, these patients have been relieved. It is obvious to all that when relief has occurred after the treatment of the eyes, plus treatment of the teeth, it is impossible to declare that either is solely the cause of the trouble. It is regrettable, therefore, that we cannot collect a large number of cases directly attributable to the teeth and proved so to be by the exclusion of all other treatment.

The moment we indulge in a shot-gun prescription, or a number of measures to correct a trouble, immediately the element of certainty fades. Ophthalmologists know that one-sided headache, and wandering pains over the upper portion of the face, are very frequently relieved on the treatment of very small errors of refraction; in fact, it might almost be said to be true that the smaller the refractive error, the greater the pain. People with five or six diapters of hyper-metropia do not suffer much pain. People with half a diapter of error suffer a great deal of pain.

Dr. Bell has set forth this subject in a very clear and convincing way. He has taken the subject, which from the standpoint of a majority of ophthalmologists has but a slender hold upon the profession, and presented it in a strong manner; that constitutes a quality which we know as literary ability.

In the future it will be my purpose not only to examine the nose, but the teeth also in cases of uncertain facial pain, and from this time on, I shall feel myself bound to you gentlemen of the Institute of Stomatology as a reliable ally.

Dr. Frank J. Parker—Dr. Bell has covered this subject so

thoroughly that there is little for me to say, beyond relating my personal experiences. When we consider the intimate relation of the teeth and the eyes by the fifth cranial nerve, it is a wonder that these cases have not been recognized long ago. There are a certain class of cases that drift from one oculist to another,—headache, orbital neuralgias, etc. We correct the faulty refraction and the headache continues. The patients go to another man who changes the glasses, and still the headaches continue. In the last few years we have been recognizing more and more the reflex origin of these conditions.

The rhinologists began to recognize three or four years ago that sinusitis was the cause of many of these cases of orbital neuralgia and eye conditions; and last year, in connection with a rhinologist, I worked along this line in about twenty cases with most astonishing results.

When we consider that the periosteum, lining the alveolar process extends to the orbit, and the intimate connection with the branches of the fifth cranial nerve, it is easy to understand how these cases of carious teeth can cause ocular symptoms.

About two years ago, at a clinic of the Manhattan Eye and Ear Hospital, I had a case of cellulitis of the orbit. A number of men saw it, and could find no cause for the condition. Under the usual treatment it was not relieved, and the man came one day complaining that he had a severe toothache all night. I advised him to see a dentist, as he had a swelling of the cheek as well as of the orbit, and the dental surgeon cured the orbital cellulitis. This was the first case I had observed.

Last summer I had a case—a woman of about thirty-two years of age—with persistent supra-orbital neuralgia. There was great tenderness along the supra-orbital nerve. I examined the refraction and order cylinders, telling her to come back and show me the glasses. She came back about a week later and reported that having had a slight toothache a dentist had found the cause of her trouble and had cured her.

I think there are many such cases, but the tendency of the specialist in ophthalmology, as in any specialty, is to be narrow-minded and view all conditions in his own particular line.

The quicker we get over this narrow state and recognize that the symptoms in our particular field may be caused by some

trouble in an other man's field, the more we will accomplish for our patients and ourselves.

Dr. M. I. Schamberg—The reciprocal influences that are constantly at play between the various special organs and their contiguous structures must be apparent to any closely observant practitioner, whether he be an ophthalmologist, rhinologist, gynecologist or stomatologist. The usual cases are the ones which direct our attention to the importance of our own work; but it is the unusual case which requires the closest study and scrutiny to bring about a correct diagnosis. For that reason, I am glad that the essayist of the evening and his associates were able to appear before a body of men who term themselves stomatologists. In other words, I believe there is this distinction between dentists and stomatologists, than a man who practises dentistry alone, is a man who is not covering his field as it should be taken care of.

The physician, whether he be a general practitioner or a specialist, gives the mouth over to the so-called dentist or stomatologist for his care and attention, and it is remarkable how little the general practitioner of medicine, and the members of other specialties know about the detail points connected with the study of dentistry. They have little opportunity, owing to the inadequate preparation in medical schools in this line, for study of the diseases of the mouth, and it is not surprising that there is so little known about the wonderful field in which we are working. Of course, due credit is given us for understanding the mouth fully, and for that reason I believe that every one of us should practice stomatology and not satisfy himself with practising merely dentistry; because dentistry in itself implies merely disease of the teeth, whereas stomatology refers more particularly to all the diseases about the mouth and adjacent structures.

I made reference to this point for the reason that I believe there are a great many men who do not pay sufficient attention to the influence of the dental organs and the diseases to which they are heir, in affections of other parts of the body; nor do they accept the conditions of the ear, eye, nose and throat, and in fact, structures far removed from the mouth—the effect of these organs, tissues and parts, upon the mouth.

It has been very interesting for me to meet cases in consultation with eye and ear men, and I must say that I have more

occasion, I believe, to meet the ear men and the nose and throat men, who have cases with symptoms reflected to the parts, in which they are most interested, in which the lesions were found in the mouth. It is far less frequent—and it is singular that it should be so—for the eye to be involved as a result of dental or oral disease; but it nevertheless is true, as stated by the essayist, that these obscure cases that arise from time to time are due to no other trouble than the ones mentioned in connection with the teeth; and I might go further and enumerate some of the other conditions about the mouth, which the essayist of course did not touch, because he felt it would be taken care of by the members of this Society.

When it is remembered that the dental organ in its association with the trigeminal nerve may impart sensation through the pulp, through the peri-dental membrane, and through irritation upon the mucous surface by irregularly shaped cavities of decay or by prosthetic pieces, it is not at all surprising that it requires a very close study at times to determine the cause of an obscure condition.

Then again, we must take into consideration that each one of the thirty-two teeth in the mouth must be carefully studied, and oft-times a slight condition—a change in the blood supply of the pulp, a pathological change in the pulp, plays an important part; and these states of pulp vitality and pulp disease require very careful dental technique to determine the existence of the disease.

A pulp stone is a condition that is oft-times difficult to diagnose. Then there are many of the hidden conditions not apparent upon a casual examination of the mouth,—conditions which are found within the bony structure, unerupted teeth, tooth affections due to infection which has reached the deeper structures through the peridental region, as so beautifully illustrated by the essayist in a clinical case; and those instances where it reaches the deeper structures through periapical troubles.

I might cite several definite cases, where the eye had been involved as a result of oral disease, and in doing so, I will probably refer to a case or a condition that was not mentioned by the essayist—a condition of Bell's palsy. Now what relation has an abscess, or an inflammation of the upper third molar and the

roots of the second molar, to a Bell's palsy? How remote the possibility of such a condition occurring? Still I had a case as far back as twelve years ago, in Philadelphia, where the brother of a dentist was sent to me for examination. I found him with a defined Bell's palsy, inability to close the eye, and the eye symptoms were the ones that were first evident to his friends. He was unable to close his eye, and he had a pronounced conjunctivitis from the irritation that is occasioned by the inability to close the eye, exposure, etc.

We could scarcely trace the relationship between troubles which would involve the trigeminals and troubles which involve the facial nerve; but in this instance, the removal of the upper third molar and several roots of the second molar cleared his facial palsy in a very short time.

During this past summer, I had occasion to operate upon a young lady who, following the removal of some third molar teeth, had acquired a very virulent infection beneath the periosteum of the upper jaw. The periosteum was spread from the bone as high up as the orbit. In cases of that kind one usually sees a very pronounced cellulitis, and in this case, the cellulitis extended not only to the lower eyelid, but to the upper, and the eye was completely closed. The side of the head was swollen, temperature 104; there was a pronounced discharge from the eye, and it required the greatest care, coupled with my treatment of the mouth, to prevent any serious inflammation of the eye. The eye was bathed repeatedly each day by the nurse to prevent any serious complication there.

Now the involvement of the eye in relation with tooth troubles, is a very interesting study; and we may not at all times, jump at conclusions. In other words, we may have a co-incident involment of the eye and tooth. There are very few people nowadays that are free from some form of eye trouble, and very few free from some form of tooth trouble; so that it requires a very careful attention to tooth conditions, and a very close relationship between the ophthalmologist, and the stomatologist, to determine the absolute dependence of one condition upon the other. In a case under my observation at the present time, I am of the firm belief that the patient has both eye trouble and mouth trouble—in fact, the patient has obscure pains throughout the

entire side of her face. Her mouth has been very carefully examined. I resected her inferior dental nerve and relieved that.

This patient is unquestionably suffering from uterine disturbances, because after I had her in the hospital, I learned from the nurse that she was decidedly irregular as far as menstruation was concerned; in fact, she failed to menstruate for periods of three or four months at a time, and was subject to excruciating uterine pains, while the pains in her face were more pronounced during these intervals between the menstruation. We all know of the isolated cases of facial neuralgia that have been acquired in no other way than by operations by gynecologists in alleviation of uterine troubles.

What I have said, may be entirely too general for the purpose of an absolute discussion upon the paper; but I feel that it will indicate the absolute interdependence of the physician and the stomatologist. I do not know any greater calling than that to which the members of this Society are drawn; and I can conceive of no physician who could possibly cure absolutely a bad case of gastritis, enteritis—in fact, any constitutional disease—unless the mouth was in an absolutely hygienic condition. Furthermore, the excellent work of Upson, the neurologist in the middle West, who recently spoke of cases in which he has found dental lesions, must be absolute evidence of the work, and the definite reflex conditions which are brought about by obscure dental lesions. It is not as a rule the simple caries in the teeth, nor the simple alveolar abscess; but it is the hidden condition—the condition which is difficult to detect, that is usually responsible for many of these most aggravating cases which bring about eventually in many instances, through prolonged irritation, the devilish cases of *tic douloureux*.

Dr. H. L. Wheeler—It gives me great pleasure to see Dr. Bell in line with some of our enthusiastic and zealous brethren, who are attributing fifty per cent of all human ills to troubles of the mouth. I am sure that this will make us think that dentistry is of some importance sooner or later. Aside from the humorous—it is really a pleasure to listen to such a well-prepared paper as this one, in which the efforts of research and experience are combined to give us a practical idea of the complexities of nervous disorders and neuralgias, and how the dentist may combine with

his colleague, the ophthalmologist, or the rhinologist, to assist in alleviating those terrible pains.

It seems to me that there is an obverse lesson, we might say, to be gained from this paper. Dr. Bell has frankly stated and shown by his practice, that where he meets a case that baffles him, or in which he is uncertain, he calls in a stomatologist or a dentist. The obverse of that would be, in obscure neuralgias where the dentist is unable to find the difficulty in the mouth or teeth, that he should call in the ophthalmologist or rhinologist to assist him in locating the difficulty. If he were to do this more often, I am sure that our service to our patients would be greater than it is when we do what we can, and then neglect to go further.

That the public, as well as the medical profession are becoming much more interested in the fact that evil conditions in the mouth may lead to a legion of physical disorders and troubles, is attested by such paper as this; and should stimulate us as a profession to attempt to obtain a broader and wider knowledge on the subject of the inter-related parts about the mouth and teeth.

Dr. F. L. Stanton—Many of the severe conditions pictured by the essayist could be avoided in the future by proper preventive measures of the ophthalmologist, rhinologist and the stomatologist. The dentist in examining children with deformed arches and carious teeth should always have in mind the probable associated pathological conditions of the naso pharynx, the nose and the eyes. The rhinologist should also think of the mouth and the eyes and the ophthalmologist should ever bear in mind the other associated fields which are so linked together in health and disease.

Dr. J. Morgan Howe—I wish to say just a word in appreciation of this valuable contribution by Dr. Bell, in the evidence of a historical character, and in his personal experience as well. I think it very valuable, and his conclusion that it is not safe for an oculist to practice without the assistance that we can render, is of course correct. We will have it impressed again upon our minds that we are members of a brotherhood, as has been so well stated by one of the gentlemen who discussed the subject, we should not take such narrow views as specialists are prone to

do. Dr. Bell's paper will assist us all to take broader views than have commonly prevailed.

Dr. Bell—Mr. Chairman, I do not think there is anything I can add to what has been said, except that I wish to thank The New York Institute of Stomalology for the kindness with which they have received my paper.

The President—The Institute is under great obligation to Dr. Bell for his carefully prepared paper and we thank him heartily for what he has done for us. We hope he will come again, because now we feel somewhat acquainted with him.

We are also under obligation to his colleagues, Dr. Claiborne and Dr. Parker, and we are appreciative of Dr. Schamberg's valuable discussion, also.

Adjourned.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, November 1st, 1910, at the Academy of Medicine, No. 17 West 43rd Street.

The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

The President—The Chairman of the Research Committee, Dr. J. Morgan Howe, has a communication to make.

Dr. J. Morgan Howe—To The New York Institute of Stomatology: In view of the favorable action of the Board of Directors on the question of continuing the investigations into the possible causes of dental decay and other dental diseases, as they have passed a resolution authorizing your Committee to continue the work, and voted an appropriation from the Dr. Lord fund to meet the expense; your Committee on Research have pleasure in reporting that Prof. Gies of the Department of Biological Chemistry of the College of Physicians and Surgeons, and Dr. Lathrop who assisted Prof. Gies last year, are both willing to continue the study of dental disease during the next academic year, and they have agreed with your Committee to begin at once. The first work to be undertaken will be the cultivation of bacteria from typical cases of decay in teeth, with the view of studying the effects of their products on enamel and dentin, and of their action in plaque formation.

The Committee would like to have the cooperation of as many dentists as will take the trouble to select cases of marked active decay and of pyorrhea from which cultures may be taken. Dr. Lothrop will call on dentists in their office to take cultures, at such times as may be agreed on by him, or the dentist can take the cultures himself, by touching a sterilized platinum wire to the diseased area, and planting in culture media to be provided. No patient need be in the least degree fearful of the proceeding, as it will need but a touch of the wire to carry away the needed culture, and it will be helpful in the work to have Dr. Lothrop see as many cases of dental lesion in their various manifestation as possible.

There has appeared to be some favorable results following the use of a weak acid in the mouth preceding the usual cleansing with the brush and dentifrice. This suggestion was made—it will be remembered—by Professor Gies, because it was found that a large content of mucin in the saliva was the only definite finding that could be said to characterize cases of great susceptibility to decay. And as acids will cause mucoid substances to coagulate and break up, so as to let go their hold on what they adhere to, he suggested weak vinegar solutions to be freely applied and brushed over the teeth before the ordinary cleansing to help to disintegrate and remove plaques and slimy debris. Your Committee would be glad if more dentists would advise patients to pursue this method, who have heretofore been unable to keep the surfaces of their teeth clean by other methods. We desire a large amount of testimony on this point from as many sources as possible, after thorough trial on as many patients as they will consider good tests.

All who will cooperate in obtaining bacterial cultures will confer a favor by notifying either member of your Committee as soon as possible. Their names and addresses will be sent to Prof. Gies and arrangement can be made later for Dr. Lathrop to call for cultures at appointed times. The report of Prof. Gies' address before The Institute and of the work done last year is analysis of saliva, will be published in succeeding numbers of the Journal of The Allied Societies.

Respectfully submitted,

ARTHUR W. MERRITT,
59 W. 46th St.

J. MORGAN HOWE, Chairman,
12 W. 46th St.
Of Committee.

The President—This full and excellent report from the chairman of our Research Committee, is an example worthy of being followed by other working committees of this body. It will not only be received, but will appear in full in our proceedings.

Since our last meeting, the Institute has sustained a great loss in the death of Dr. J. Adams Bishop, a charter member of

this society. The President has requested Dr. J. Morgan Howe to present a memorial minute at this time.

Dr. Howe then read as follows:

By the death of our late friend and co-worker, Dr. J. Adams Bishop, we are again reminded of the fact referred to by St. Paul in his phrase "we have not here an abiding City."

Our friend was a cheerful, helpful coadjutor in our enterprises, from the organization of this Institute, being one of our charter members, and our faithful, conscientious Treasurer for seven and a half years, until the time when he was about to retire and spend the evening days of life in the country home he had provided about six years ago, in New Canaan, Conn.

It is especially appropriate for us to recall and remind each other of the worth and virtues of those whose attainments it is worth while to emulate; so we have a sad sense of pleasure in calling to mind the incidents of the career of Dr. Bishop.

He was the son of a farmer, born in Norwich Township, Conn., in 1833, where he spent his youthful years, until 1850 when he went to Worcester, Mass., where he was employed by a jeweler to work at repairing watches and clocks, and metal work, including the art of soldering. Later, while there, he became associated with his brother, the late Dr. Henry F. Bishop, in the study and practice of dentistry, continuing in this relation for four years in that vicinity.

The carving of artificial teeth for subsequent baking was an artistic attainment of some dentists of that time, and in this Dr. Bishop became so skillful that he was given a position in the office of Fowler & Preterre in New York, but he soon afterward accepted an offer from the late Dr. T. B. Gunning to be associated with him. Here our friend had an extensive experience in treating fractures and surgical cases in hospitals, and during the eight years of his association he served two terms of enlistment in the U. S. Army during the Civil War, entering as a private, but advancing to the position of Assistant Surgeon with the rank of Lieutenant.

Then he became associated with the late Dr. George E. Hawes, located at that time in Bond St. It was soon after this connection with Dr. Hawes occurred, that on the same night that President Lincoln was assassinated, the attempt to also murder

Secretary of State Seward resulted in fracturing his jaw, which injury Dr. Gunning was called to treat.

In these cases Dr. Bishop had proved to be so indispensable an assistant, that Dr. Gunning succeeded in prevailing upon Dr. Hawes to spare Dr. Bishop, and on the latter to go, and assist him in the treatment of this celebrated case.

After the term of association with Dr. Hawes, there followed a period of seven years of independent practice, extending from 1866 to 1873, and then a return to an association with Dr. Gunning for two years, because of specially favorable inducements offered, during most of which period Dr. Gunning was in Europe.

Then Dr. Bishop began independent practice again in 36th Street, where he remained eleven years, until 1886, when he removed to No. 30 West 48th Street, where no doubt most of us remember him, and where he remained with his retirement from practice in 1904. Some of us will no doubt remember with pleasure that at that time, the present President of the Institute, gave Dr. Bishop a complimentary dinner, at which many kind expressions of regard for him were expressed, and earnest wishes for his enjoyment of the leisure of country life. And this he afterwards declared he had realized. He spoke with enthusiasm of his delight in the songs of birds, and of the pleasures of his country home, and of Nature's reminder to him of the nearness of the Creator.

While he had lived in New York for nearly fifty years, he was engaged in many good works of charity and benevolence, many of which were connected with the Madison Avenue Presbyterian Church, of which he was an official. During many summer seasons he accompanied and cared for companies of children en route to the country, for fresh air holiday outings. He was a typical Christian gentleman, full of interest and sympathy for the least of those to whom he could minister, and willing and anxious also to do his part as a good citizen of the city and state, in whatever appealed to him as desirable for the general good.

As a professional man, Dr. Bishop took high rank in the lines of work that he chose to follow, and among his confreres he commanded not only their great respect, but also their sincere

regard. He was tenacious of his own views on professional subjects, but slow to criticise others who differed from him.

The President—We all thank Dr. Howe for this beautiful tribute to the memory of Dr. Bishop. It will appear in full in our proceedings, and a copy will be sent to Mrs. Bishop.

Dr. F. L. Stanton presented the model of an interesting case showing supernumerary teeth.

The President—The Executive Committee has prepared a feast of good things for to-night, all of a practical nature.

The first subject will be "The Anatomical Dummy in Bridge-work," and its exponent will be Dr. W. D. Tracy.

(For Dr. Tracy's paper see page 18). The discussion of Dr. Tracy's paper was participated in by Drs. Dunning, Collins, Getz, Palmer, Wilson and Tracy.

Dr. Geo. A. Wilson, Jr.—I brought a little bridge with me, which I would like to have passed around with Dr. Tracy's models. It is highly impracticable, but I would like to have it shown as an example of what should not be done.

Dr. C. W. B. Wheeler read a paper entitled: "The Technique of Making Jackson Appliances with Precious Metals."

(For Dr. Wheeler's paper see page 23.)

Dr. E. B. Prentiss read a paper entitled: "Plaster Dies for Porcelain Inlays."

(For Dr. Prentiss' paper see page 20.)

The discussion of Dr. Prentiss' paper was participated in by Drs. Tracy, Dunning, Palmer, Maynard, Wilson, Hoag, Locherty, Fischer, Ogden and Prentiss.

Dr. J. B. Locherty read a paper on "Fractured and Impaired Roots and Teeth."

(For Dr. Locherty's paper see page 25.)

The discussion of Dr. Locherty's paper was participated in by Drs. Kimball Marshall, Leroy, Fischer and Locherty.

Adjourned.

THE PRESIDENT'S ADDRESS.*

BY CORNELIUS S. HURLBUT, D. D. S., SPRINGFIELD, MASS.

To-day, June 14th, witnesses the opening of the forty-sixth annual meeting of the Massachusetts State Dental Society.

For the past twenty or twenty-five years the meetings have always been held in Boston but we are now glad to welcome the members to this our City of Homes, and trust we may have the pleasure of doing so again in the not distant future.

A very important feature of the meeting as prepared by the Entertainment Committee will be the outing on Mt. Tom, to which the ladies are especially invited.

The Essay and Clinic Committees have varied from the general order of the usual program by obtaining fewer but especially fine speakers and clinicians, who will have most timely and interesting subjects.

During the past year several important subjects pertaining to the profession of dentistry have greatly interested the members of this society.

This seems a most opportune time to bring some of these questions up for discussion.

Early in March some members of the profession brought a bill before the Legislature which was in effect that lady assistants, or so-called dental nurses, might be employed in performing prophylaxis treatment at the chair without a license, but the bill was not reported favorably.

One can very easily see how it would be a great benefit to the dentist to employ such an assistant, who was not a graduate, to do this work while he could spend his time at a case more difficult, but perhaps not more important.

I doubt not that most of the members of this society could employ such an assistant and live up to the law, but it would only lead to make an opening for miscrepulous and less conscientious men to introduce assistants who would ride over the law and be allowed to perform other operations. Believing that this bill would be a means of letting down the bars and exposing the

*Read before the Massachusetts Dental Society, June 14, 1910.

honor of the profession to the unscrupulous and advertising men, who are looking for the commercial side only, your president appeared before the Committee on Public Health and spoke against the introduction of this bill. But in no way did I represent the society, only as I believed it was for the best interest and high standard of the profession as a whole.

A vital question that has appeared before this state and society for the past two or three years especially has been that of the State Board of Registration.

For the past twenty-five years the State of Massachusetts has been in the forefront among the States in the character, ability and professional standing of the members of its examining boards.

The standard has been of the highest and best and has been maintained to such an extent that other boards have looked up to and sought ours as their preceptor. The work which the individual members have accomplished has been active, conscientious, untiring and worthy of the highest approbation, as the results have proved.

Now, after continued service of terms varying from twelve to twenty or more years, the cry comes that these men have served long enough, and so it may be, and a change on the board may be for the best. But are we going about it in the right way for the best interests of the state and the profession.

The political measures which were taken by men to get on the board at the recent appointment were a disgrace to the profession, and the moment we allow politics to play an important part in our profession we are lowering the standard and ethics of that profession.

Gentlemen, we are members of an honored and honorable profession, and we all are working for the maintenance of that honor; let us strive for the bettering of conditions, not for the lowering of the standard. "Let us walk worthy of the vocation wherein we are called."

The better method to take, in my mind, would be to change the State law, whereby a man could not serve on the board longer than a certain number, say ten or fifteen years, and when a member's term is about to expire, the District Society in the location from which he comes should select some man of good character and ability and work for the appointment of that man

to the vacancy. In this way any friction and discontent on long terms of service would be avoided.

Desiring to know how the colleges might feel regarding this question, some few weeks ago I wrote to the Deans of ten or twelve different Colleges and Universities.

Some of these have responded, as follows:

Baltimore Dental College.

Philadelphia Dental College.

Medico-Chirurgical College.

University of Pennsylvania.

University of Michigan.

University of Illinois.

University of Buffalo.

One said the term of service should not exceed five years. Another believed three to five years. Still another believed in rotation, but favors a fairly long term of office, that the required experience which is necessary in conducting the examination may be possible.

Another writes that a man should continue in office so long as he is useful to the commonwealth. Another that he believes in moderately long service, but he emphasized the question of age limit.

While another says that a man who has qualified himself to do a certain line of work should be encouraged to remain in the work so long as he is effective. But it is also desirable to introduce new blood, for it is possible that a man may occupy his position too long.

It therefore would seem wise to recommend that the law be changed in substance as follows:

First, that one member of the board be selected each year for a term of five years, and second, that the reappointment of each member should not be made more than twice, thus placing the maximum term of service for each member at fifteen years.

One reason, it seems to me, that we do not get the young fellows in our societies more, the graduate who is thrown out in the world on his own resources and who is too often weighed down by debt, is simply because he thinks he can't afford the expense.

He is just the man we want, and we are the fellows, at

least professionally, with whom he should associate. We ought to do something definite to get hold of and keep such men. It would be my recommendation to have a committee appointed to find out who these men are as they graduate and locate in a town or city, to investigate their moral as well as their college standing and ethical ideas, and if they are found to be desirable men, to give them their membership in the State Society, through the District, for two years, thus in a way placing them on probation.

Some eight or ten years ago, the Metropolitan, the South Metropolitan and the Northeastern Districts were consolidated, forming the Metropolitan District as it is to-day. This covers an area including Boston and surrounding towns and cities, and added to this the cities to the south, such as Lowell, Lawrence, etc., the District includes more than 50 per cent of the entire membership of the State Society and over 250 of these are in or immediately around Boston. It would seem wise that this district be divided.

You ask how this can be, when a consolidation was necessary before. Take the cities of Lawrence, Lowell and Haverhill, altogether there must be about 200 dentists, and yet in these cities there are but 17 members of the State Society. There is a great mistake somewhere. The distance to the Boston meetings is so great that the members have given up going entirely, and thus it is there is this falling off.

Although dropping from the State Society, the men have realized the importance of fellowship and professional intercourse, and in all these cities, local societies have been formed, which are doing active work and good meetings are held. It would seem a possibility, and a great probability, that a combination could be brought about of these societies, and a sixth district be formed, composing the cities and towns of the former Northeastern. To further this end I would recommend that a committee be appointed by the incoming president, consisting of one member from each of these several districts, and a member-at-large from one of the cities mentioned. This committee to investigate the condition of things and ascertain whether or not it would be possible to form another Northeastern District.

Another important question which has come before our notice the past year is that of the Hygiene Council.

For the last three or four years the Hygiene Council of Massachusetts has accomplished some fine work, and has been recognized throughout the country as one of the foremost organizations of its kind in the line of work undertaken and results obtained.

A great deal of credit is due the men who have labored in its interest and have worked hard for the fulfillment of its ideals. Being a Massachusetts institution in name, the Hygiene Council should be one in reality, and should always have been a part of the State Society, rather than apart from it.

Although the State Society has furnished the greater portion of the means to finance the enterprise, yet it has had very little if anything to say as to its government.

I believe that the Dental Hygiene Council of Massachusetts should be a part of the State Society and its officers should be elected by the Society, as well as being from among its members.

If this cannot be brought about, I would recommend that the State Society have a Hygiene Committee of its own, to be appointed as the other committees. And that the money expended by said committee should go through the hands of the State treasurer.

In a few weeks it is expected that ground will be broken in Boston for the erection of a Dental Infirmary. This is to be known as the Forsyth Dental Infirmary for the poor children of Boston. Two brothers, Mr. Thomas A. Forsyth and Mr. John H. Forsyth, have made a gift of \$500,000 as a foundation fund for the establishment of this infirmary. The building is to be modern in every respect, and equipped with all the up-to-date appliances. This is the first institution of its kind in the world, and Massachusetts should be proud that it is to be located within her borders. This was made possible through the instrumentality of Mr. Forsyth's dentist, Dr. Erwin A. Johnson, of Boston. He is made one of the trustees. Dr. John F. Dowsley, of Boston, is also on the same board.

This Infirmary will not be affiliated with any college, Society, or Dental Hygiene Council. It is a private, independent institution. On April 16th the Philadelphia Dental Club, at its annual meeting, passed resolutions to the donors of this institution, expressing the deep appreciation of the importance of their benefaction, and I would recommend that some similar resolutions

be extended at this meeting to these gentlemen for this advanced step in Dental Hygiene.

The foregoing statements and recommendations represent the problems which we have been facing during the past year, and which we must attempt to solve conscientiously and for the best interests of the Society and its members.

Who can say that Dentistry is not making tremendous strides? Look at the work which has been and is being accomplished along research and educational lines. Dentistry years ago stepped from the plane of being considered a mere trade or a business into which anyone might enter with little capital and still less experience. It is to-day among the foremost of the professions. And through the press the public are realizing its advanced standard and importance.

Its members are alive to the opportunities and possibilities which are within its grasp. This is shown by the work which has been done during the past five or ten years.

The different mechanical and therapeutic methods for the treatment, filling and preservation of the teeth, all have their place according as they are used or misused. But this advance is especially recognized in the rising ethical standard, which has so permeated the entire profession that none of us can help but feel a sense of pride that we are connected with such a profession. It has shown us the importance of admiration for the good work of others. The pity and not the scorn for the mistakes of others, and above all, a deeper insight into the true force of the Golden Rule. Speaking along these lines, Colonel Roosevelt in his address at the Oxford University last week said:

"While freely admitting all our follies and weaknesses of to-day, it is yet mere perversity to refuse to realize the incredible advance that has been made in ethical standards. I do not believe that there is the slightest necessary connection between any weakening of virile force and this advance in the moral standard, this growth of the sense of obligation to one's neighbor and of reluctance to do that neighbor wrong. We need have scant patience with that silly synicism which insists that kindness of character only accompanies weakness of character. On the contrary, just as in private life many of the men of strongest character are the very men of loftiest and most exalted morality, so that I believe that in national life as the ages go by we shall find

that the permanent national types will more and more tend toward those in which, while the intellect stands high, character stands higher; in which rugged strength and courage, rugged capacity to resist wrongful aggression by others, will go hand in hand with lofty scorn of doing wrong to others."

I desire to express my sincere thanks and appreciation to the officers, chairmen and members of the various committees, for the hearty support and co-operation in the work of the year. And although we may have made some mistakes, our endeavors have been honest and we trust there has been no retrogression, but by our united effort the profession of Dentistry in Massachusetts has advanced one step higher.

A CHEMICAL STUDY OF SALIVA, IN ITS PROBABLE
RELATION TO THE DECAY OF TEETH.

(SECOND PAPER).

BY ALFRED P. LOTHROP AND WILLIAM J. GIES.¹

(From the Laboratory of Biological Chemistry of Columbia University, at the College of Physicians and Surgeons, New York).

I. INTRODUCTION.

The last number of the *Journal of the Allied Societies*² contained a preliminary statement of the general results of our study of this important subject. The investigation was conducted under the auspices of The New York Institute of Stomatology. Our paper gave the substance of a report that was presented at the meeting of the Institute on May 3, 1910.

II. A SUMMARY OF THE LEADING ANALYTIC RESULTS OF THE WORK
DESCRIBED IN OUR FIRST PAPER.

The most significant results of our analytic work (prior to May 3, 1910) were summed up in the first paper in the following general statements.

It is probable that the ordinary *normal fluctuations* in salivary viscosity, as well as in the proportions of contained mucin and dissolved matter in gross, are great enough to disguise any *quantitative* relations of these factors to carious processes, if any such interrelations exist (p. 274). Thus, there is no peculiar relation between the proportion of mucin in a given fraction of saliva and the state of the teeth of the person secreting that particular specimen (pp. 270-1).

In practically every instance the reaction of the saliva was *alkaline to both litmus and lacmoid*. In *every* case the reaction was *acid to phenolphthalein* (pp. 274-5).

No significant relationship between the acidity of a given specimen of saliva to phenolphthalein and the condition of the teeth was shown by the results (p. 276).

¹The results in detail of the work so generously done by Prof. William J. Gies and Dr. Alfred P. Lothrop during the season of 1909-1910 for The New York Institute of Stomatology, through its Committee on Research, are here presented with many thanks to those gentlemen.—EDITOR OF INSTITUTE.

²This Journal, 1910, v, p. 262.

Fractions of saliva obtained from subjects immediately after their awakening from a night's sleep were relatively high in acidity to phenolphthalein (p. 277). The production of this increased acidity was ascribed to the influence of increased numbers of oral microorganisms (p. 277).

Many specimens of saliva obtained from normal individuals immediately after arising and before breakfast were free from nitrite, but in all cases nitrite was found in specimens of saliva from the same individuals after breakfast (p. 277). This anomalous result was attributed to the action of *oxidases* from increased numbers of oral microorganisms (p. 279).

There appears to be no relation of any definite kind between the proportion of salivary nitrite and the condition of the teeth (p. 277).

There were no definite relationships between the proportions of sulfocyanate in the fractions of saliva under examination and the conditions of the teeth of those who secreted the specimens (p. 280).

III. A SUMMARY OF GENERAL DEDUCTIONS FROM THE ANALYTIC RESULTS, AS STATED IN OUR FIRST PAPER (pp. 280-1).

As we proceeded with the work, two of our earliest deductions were given cumulative emphasis. These deductions were the following ones.

That the *composition* of a given *fraction* of saliva bears no definite relation to the condition of the teeth of the person secreting that fraction and, in any individual, may normally differ considerably from the composition of other fractions.

That *causative* chemical factors in decay at any point, even if wholly external to the tooth, are *very small in proportion at any moment* and, if flushed into any ordinary fraction of saliva, are insufficient to affect the composition of that fraction in any significant degree.

In brief, our results drove us from the wide region of salivary analysis to the narrower field of *localized* external dental conditions. We felt, however, that any "substances in, or conditions of, the saliva" which bring about decay are substances, or conditions, or both, that affect the teeth *continuously but insidiously*. *Substances* which might be removed from or added to saliva, in the amounts involved in decay at any moment, without rendering

the composition distinctive! *Conditions* which might be locally effective and yet be generally inconspicuous, even ordinarily indistinguishable! These thoughts supported the conclusion that mucin is probably the *salivary substance* which is particularly influential in the development of local conditions favoring the onset of dental decay. The agents which seem to be most active in maintaining the *conditions* that propagate the carious process are non-salivary factors—bacteria and fungi. The chemical substances that may be reasonably supposed to act directly and destructively upon teeth are such as are locally produced by bacteria and fungi—acids and enzymes primarily (pp. 280-1).

Any influences of mucin as an *adhesive* medium, and of bacteria and fungi as *corrosive and enamel-puncturing* agents, in the initiation of carious processes, are doubtless exercised to their greatest degrees during periods of sleep (p. 277).

Our past acquaintance with mucin led us to conclude that mucinous coatings and deposits can probably be most effectively disintegrated with *acid media* (p. 282). We accordingly suggested that diluted vinegar or common fruit juices—*acid media ordinarily present in food*—may be very helpful agents in the removal of mucinous masses from teeth, especially if applied directly with a suitable instrument (p. 283).

IV. PURPOSE OF THIS PAPER.

It is our purpose to present, in this second paper, the analytic *details* upon which the summaries and conclusions in our first paper were founded. We shall include, also, such additional data as were obtained subsequent to the date of the meeting at which our preliminary report was offered (May 3) and prior to the end of the last academic year (July 1).

V. DETAILS OF THE ANALYTIC WORK ON WHICH THE FOREGOING RESULTS AND CONCLUSIONS WERE BASED.

A. GENERAL METHODS OF SALIVARY EXAMINATION AND ANALYSIS.

Viscosity. In describing the consistence of the specimens, three terms have been used, viz., *thin, medium* and *thick*. "*Thin*" saliva had the appearance of water and flowed freely. "*Medium*" saliva flowed freely but more slowly than "*thin*" saliva. "*Thick*" saliva was very viscid. Our deductions were more or less arbitrary, but approximately accurate results were assured by the method employed.

Mucin content: as determined by a photometric process. The turbidity produced by adding 2% acetic acid solution to filtered saliva was compared with that of known amounts of infusorial earth in distilled water, as in

water-analysis. Five standard mixtures were prepared containing $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1 and 2 grams of infusorial earth per liter of distilled water and numbered respectively 1, 2, 3, 4 and 5. Samples of the suspensions, after perfect mixture, were transferred to very small test tubes about 3 inches long and $\frac{1}{8}$ of an inch in diameter. The tubes were sealed so that the standards were permanent and the mixtures needed only to be shaken before using. *In the tables the higher the grade of the numeral, the greater the indicated proportion of precipitated mucin.* This method gave an easy and quick way of determining the *relative* amounts of acid precipitable mucin in the various specimens of saliva. With the small amounts of saliva that were available the conduct of the method was very satisfactory, as not more than 1 c. c. of the filtered liquid was required in the process. (Deficiencies in this and similar methods were mentioned in our first paper, p. 271.)

Mucin content: as determined by precipitation with alcohol. In our determinations of the "total alcohol-precipitate," we used *filtered* saliva. Foreign particles were eliminated in this way, but any suspended mucin was also unavoidably removed and lost. Errors of this kind were negligible, we think, in these *comparative* observations. One volume of saliva (5-25 c. c.) was mixed with four volumes of 95 per cent. alcohol. After standing over night for complete separation of the precipitate, the liquid was filtered through a weighed, dry, ashless paper. The precipitate was then thoroughly washed with a mixture of 1 volume of water and 4 volumes of 95 per cent. alcohol, later it was dried to constant weight at 100°C and finally weighed.

The weighed precipitate was cautiously incinerated and the ash weighed. The ash in these cases consisted of salins originally adherent to the precipitate, as well as compounds produced from the mucin salts, and associated proteins, by the combustion process. (Deficiencies in this and similar methods were discussed in our first paper, p. 271-2.)

Content of "total solids" and yield of ash. In these estimations, the saliva was filtered through paper on a covered funnel into a small bottle. The closed filtration apparatus prevented evaporation. Quantities of the filtrate, varying from 1.5 gram to 10 grams (as determined by the volume of the available supply in each case) were evaporated to ordinary dryness in weighed porcelain crucibles on water baths and the residues then rendered perfectly anhydrous over sulfuric acid in vacuum desiccators, where they were allowed to remain until their masses diminished to constant weights. Forty-eight hours were sufficient for the complete desiccation of the residues.

After the weights of the residues had been obtained ("total solids"), the organic matter was cautiously incinerated and the weights of the ash ascertained.

Both of these procedures were open to certain objections, but they could not be obviated. Possible errors due to the filtration of the saliva were referred to above. The special difficulty of preventing experimental error in ash determinations with very small volumes of saliva is self-evident. The greatest possible care was taken to prevent avoidable error.

Reaction. The reaction of the saliva was determined *qualitatively* with Kahlbaum's best neutral and red litmus paper strips, and also with lacmoid paper. We prepared the latter by soaking filter paper in a concentrated alcoholic solution of lacmoid. After the paper had been dried, it was immersed in a very dilute solution of acetic acid—just acid enough to impart a distinctly red color to the paper. After again drying it, the paper was preserved in a glass stoppered bottle. It was very sensitive to the end of our work with it. The same was true of the litmus "test papers."

The acidity was determined *quantitatively* by titration with $n/200$ NaOH solution. One c. c. of saliva was mixed with about 5 c. c. of distilled water, then 5 drops of neutral phenolphthalein solution were added,

and the mixture was titrated to the faintest tinge of pink against a white background. (The special advantages in the use of phenolphthalein for this purpose were discussed on p. 275 of our first paper, where certain facts regarding "reaction" were also stated.)

Nitrite. The presence or absence of nitrite was ascertained as follows: Saliva in a small porcelain crucible was treated with a drop or two of 10% solution of sulfuric acid. A strip of starch-iodide paper was immersed in the mixture. The production of blue coloration indicated the presence of nitrite. The degree of promptness of this reaction was an expression of the proportion of contained nitrite.

Sulfocyanate. Our method for the determination of sulfocyanate was a simple modification of the classical process. Standard aqueous solutions of ammonium sulfocyanate, containing 1 part of sulfocyanate in 5,000, 10,000 and so on up to 200,000 parts, were prepared in adequate volumes for use in all the determinations. We placed 1 c. c. portions of these solutions in a corresponding number of porcelain crucibles of uniform size. The crucibles were aligned in the order of the concentrations of their contents. To each of the 1 c. c. portions of standard solutions were then added, from dropping bottles, 2 drops of a stock 10% solution of hydrochloric acid and 3 drops of a stock 5% solution of ferric chlorid. A series of standard colorations was obtained in this way and in this manner could be accurately duplicated at desire. The colorations were identical with those in the salivary tests, and afforded a constant and satisfactory basis for accurate comparisons. A series of standard solutions kept in covered crucibles did not deteriorate in three days. It was thus possible to quickly and accurately determine the absolute amount of sulphocyanate in the salivas investigated. That the resultant color was due to sulphocyanate was indicated by its invariable disappearance on the addition of a few drops of a solution of mercuric chloride. The white crucible served as an excellent background, making the matching of colors a simple matter and more accurate than by the use of colored papers. Even when the amount was very small (e. g., 1:200,000), the resultant color was distinctly different from that of a "control" of distilled water treated with the ferric chlorid solution.

Exactly 1 c. c. of the saliva to be tested was placed in a crucible of the size containing the color standards. The volume of saliva was given exactly the same treatment with acid and ferric chlorid as that accorded the 1 c. c. portions of the standard sulfocyanate solutions. The resultant color was matched with its equivalent in the standard series and, the content of sulfocyanate in both matched samples being the same, the proportion in the particular specimen of saliva was thus directly, speedily and accurately established. *The smaller the sulfocyanate figure in the tables, the greater the proportion of sulfocyanate in the saliva.*¹

B. GENERAL PRELIMINARY OBSERVATIONS.

Before elaborating a plan for the study of saliva from cases of dental disease, we performed many experiments for the establishment of approximately normal view points in respect of both composition and technique.

¹The December (1910) issue of *Dental Cosmos* (p. 1346) contains a very suggestive paper by Bunting on the classical method of determining sulfocyanate in saliva. *Bunting's observations emphasize the fact that salivary sulfocyanate determinations in the past have failed to show any relationship between sulfocyanate content and carious processes.* We are now studying certain points which Bunting's findings bring forward for closer investigation.

It was found that when samples of saliva were allowed to stand over night, changes took place which rendered the results of an analysis almost wholly valueless. The consistence, even if very thick, became thin and watery, owing to bacterial decomposition of the organic matter; and the odor became putrid. The acidity to phenolphthalein decreased and the reaction to litmus became more strongly alkaline. The sulphocyanate content remained unchanged while the nitrite, unless very abundant, disappeared entirely. Nitrite was usually absent from morning samples owing probably to increased bacterial action. It was thought that its occurrence might be due to ingested nitrites but its presence in abundance in *some* morning samples soon caused an abandonment of this view (first paper, pp. 277-79).

Table I, below, presents a few of the most significant *series of results* of the preliminary observations. (These results were omitted from our first paper). The teeth of each individual referred to in Table I were in good condition. All the subjects enjoyed excellent health (before, and continuously since, the specimens were obtained). The results in Table I show clearly how decidedly the saliva of a given individual may vary in composition on any day or during any succession of days. See page 83 for similar results in a case of perfect immunity from dental disease.

TABLE I.

Data Showing Diurnal Variations in the Composition of the Saliva of Normal Persons.

First Subject. A. P. L., Aged 25.

TIME	Acidity : c.c. of N/200 NaOH per 1 c. c. of Saliva	Sulphocy- anate : 1 in x thou- sands parts of Saliva	Nitrite: + signifies present — signifies absent	REMARKS
First day.				
8:00 A. M.	0.9	Medium	—	On arising
10:30 A. M.	1.2	Medium	+	
1:30 P. M.	1.5	Medium	+	½ hr. after lunch
4:00 P. M.	1.25	Medium	+	
Second day.				
8:00 A. M.	1.4	Strong	—	On arising
9:30 A. M.	1.6	Medium	+	
12:00 M.	0.95	Medium	+	Before lunch
12:45 P. M.	0.35	Medium	+	During lunch
1:45 P. M.	1.2	Medium	+	After lunch
4:15 P. M.	0.4	Weak	Very weak	Paraffin chewed

TABLE I (Continued).

TIME	Acidity: c.c. of N/200 NaOH per 1 c. c. of Saliva	Sulphocy- anate: 1 in x thou- sands parts of Saliva	Nitrite: + signifies present — signifies absent	REMARKS
Third day.				
12:15 P. M.	1.3	Medium	Weak	
Fourth day.				
1:00 P. M.	2.7	20	—	Nothing eaten for 18 hrs.
Fifth day.				
8:00 A. M.	1.35	15	—	On arising
10:00 A. M.	1.4	20	—	
Sixth day.				
8:00 A. M.	1.0	15	Strong	On arising
10:30 A. M.	1.0	30	Strong	
2:30 P. M.	1.3	30	Strong	
Seventh day.				
2:30 P. M.	1.6	20	Strong	
Eighth day.				
2:00 P. M.	1.7	30	Weak	
Ninth day.				
9:00 P. M.	1.1	30	+	
Tenth day.				
2:00 P. M.	1.7	25	Strong	
First day. Second Subject. W. J. G., Aged 38.				
8:00 A. M.	1.8	Strong	—	On arising
10:00 A. M.	1.1	Medium	+	
3:00 P. M.	1.0	Medium	+	
5:00 P. M.	1.0	Medium		
Second day.				
7:00 A. M.	2.8	15	—	On arising
8:15 A. M.	0.8	20	—	Before breakfast
8:45 A. M.	0.6	30	Strong	After breakfast
10:30 A. M.	0.8	20	Strong	
First day. Third Subject. E. D. C., Aged 23.				
10:30 A. M.	0.6	Weak	+	
1:30 P. M.	0.8	Weak	+	
Second day.				
2:45 P. M.	0.65	Weak	+	
Third day.				
8:00 A. M.	0.85	30	—	On arising
Fourth day.				
12:00 M.	0.7	30	+	
Fifth day.				
2:00 P. M.	0.7	30	Weak	After smoking
First day. Fourth subject. E. N. H., Aged 23.				
10:30 A. M.	0.5	Strong	Strong	
1:30 P. M.	0.9	Strong	+	
Second day.				
11:00 A. M.	0.6	15	Strong	
Third day.				
4:00 P. M.	0.5	30	+	

C. STUDIES OF SALIVA FROM TYPICAL CASES OF DISEASE AMONG
DENTAL PATIENTS.

Our work was undertaken at the suggestion of the Research Committee of the New York Institute of Stomatology. One of the most gratifying prospects at the inauguration of the work was the assurance that members of the Institute would endeavor to obtain for us specimens of saliva from typical cases of dental disease. The hope that many such specimens would be provided was fully realized. For their generous cooperation in this regard we are glad to acknowledge our indebtedness to the following dentists: Drs. G. S. Allan, J. K. Burgess, S. E. Davenport, Leo Green, J. Morgan Howe, R. G. Hutchinson, Jr., G. H. Leggett, C. C. Linton, J. B. Locherty, S. H. McNaughton, A. H. Merritt, H. B. Ogden, E. H. Raymond, Jr., K. C. Smith, W. D. Tracy, A. S. Walker, H. L. Wheeler.

General procedure in the collection of the saliva received from dentists. Our preliminary studies emphasized the necessity of giving our method of collection the most careful attention. The maintenance of the following four conditions was obviously of primary importance:

1. Secretion of the saliva by the patient under psychical and oral conditions as nearly normal as possible.
2. Prevention of alteration in composition of the saliva after its secretion and collection.
3. Prompt delivery of the collected specimens at the laboratory.
4. Immediate subsection of the delivered specimens to analysis.

The necessity of close observance of these requirements was orally stated to each of our dental associates before specimens were collected. Each collaborator was provided with copies of the blank form which is given on the opposite page.¹ A full clinical record of the case was submitted with each specimen of saliva sent to the laboratory by the dentist in charge. Every effort seemed to be made by each collaborator to respond to all our requests.

¹We are indebted to Dr. J. Morgan Howe for special guidance in the preparation of the blank form for the clinical records.

Saliva should be forwarded, with this record, before 2 P. M. of the day of collection.

CLINICAL RECORD FOR AN ANALYTIC STUDY OF SALIVA. No.....

By Drs. Alfred P. Lothrop and William J. Gies,
of Columbia University.

In collaboration with the New York Institute of Stomatology.

No. on bottle of saliva	Name or initials of patient	Age of patient	Sex of patient
----------------------------	--------------------------------	----------------	----------------

.....
Decay of teeth	Character and color of decay	Prevailing location on teeth	

.....
Erosion	Location and rapidity	Sensitiveness of surfaces

.....
Precipitation on teeth	Tartar	Color	Hardness	Location

.....
Pyorrhea	Location of pockets	No. of teeth involved	Character of pus and of concretions

.....
Immunity	Appearance of teeth and gums	Habits of patient locally

.....
Health of patient	Disease conditions, if recognized

.....
Additional points of clinical interest, if any:

Remarks:

This sample of saliva was obtained
a. m.

at about.....on.....1910..
p. m.

(Signed)

Dr. Gies' laboratory address: 437 W. 59th St.; telephone number:
Columbus 1957.

Psychical conditions attending the secretion and collection of the saliva received from dentists. The saliva from these cases was collected by the dentists in their offices and under their personal direction from willing patients without special inconvenience or annoyance to any one concerned. Contamination of all kinds was avoided. As a rule, the saliva was obtained from patients who were about to be given dental treatment.

In most instances, it may be safely inferred, the isolated saliva was essentially natural in its production and practically unaffected in its collection. Some patients were unable, apparently on account of nervousness, to secrete an adequate supply of saliva, and no satisfactory analyses could be made in such cases. We fully recognize the possibility that unavoidable error may have been introduced by the psychical disturbance of the individual patient, both by the prospect of impending dental distress and the emotions attendant on the process of collection described below. There is no reason to think, however, that psychical influences changed the chemical nature of the collected specimens *sufficiently* to prevent the detection of possible salivary factors in any of the cases of observed disease from which saliva was selected for analysis.

Precise method of collecting the saliva received from dentists. Only cases of special interest, such as those showing comparative immunity or marked decay, or erosion, or pyorrhea, were requested from dentists, for it was possible to obtain an unlimited number of samples from ordinary cases in our own laboratory. We forwarded to each dentist wooden boxes holding six half-ounce, glass-stoppered, bottles, which were kept firmly in place by a grooved cover, so that there was no danger of leakage. The box also contained a small glass funnel. In each instance the patient, without the aid of any secretory excitant, expectorated as frequently as it was convenient to do so directly into the little funnel placed in the neck of one of the small bottles. The funnel served to keep the main bulk of the saliva covered. Any change in the collected material due to concentration by evaporation of the saliva adherent to the funnel was negligible. This simple method of collection was devoid of appreciable chemical defects and presented no *inherent* psychical objections. The desired volume of saliva was usually obtained in a few minutes at a normal rate; and, with the stopper of the bottle tightly in place and the bottle held securely in its position in the box, the specimen was promptly sent by messenger to our laboratory, where it was immediately subjected to analysis.

This method of collection made the use of a preservative unnecessary and contamination through such influences was prevented.

Our special aim, in the use of this method, was the maintenance of the four conditions mentioned on page 72. The method appears to have been as successful as any method of collection can be. Collections of saliva by a dental suction tube during a sitting was entirely out of the question, as the flow of saliva is apt to be particularly abundant and unnatural, under such conditions, to say nothing of the contamination by blood and other substances which would undoubtedly result.

Morning specimens only were desired, as it was necessary to make the analyses in the afternoon without the use of artificial light. A messenger was sent to the dentist's office to receive specimens on receipt of a telephone message to that effect, so that the analyses were made, as a rule, within a few hours of the time of collection. The box with its funnel was returned to us, even if one sample only was forwarded, and a new box and set of bottles were left in exchange. Thorough cleansing and drying of the bottles and funnel after each collection were accomplished by us in all cases. Eighty-two specimens were selected for analysis from among those forwarded to us by dentists. In most instances the supply of saliva was sufficient for all tests except the determinations of "total solids" and ash.

The analytic data obtained in these particular studies are summarized in Tables II, III, IV and V (pages 76-77).

The extreme differences among the results in Tables II to V, inclusive, may be seen at a glance in the summary comprising Table VIII (p. 79), where comparative data which were obtained in additional experiments are also presented.

D. STUDIES OF SALIVA FROM CASES OF RELATIVE IMMUNITY, AND
OF ORDINARY DECAY, AMONG FIRST YEAR
STUDENTS OF MEDICINE.

Reasons for this special extension of the work. The results in Tables I to V, inclusive, are convincing evidence in support of the negative conclusions which we have summarized on the opening pages of this paper. We were dissatisfied, nevertheless, with two unavoidable features of the work on the specimens received from dentists: (1) The patients were emotionally disturbed, to some extent at least, and there were the consequent *tendencies* to abnormality in secretion that we have discounted to some extent but which others might be disposed to emphasize. (2) The volumes of the specimens were not large enough to give us the analytic freedom that is desirable in such work. It was therefore expedient to conduct another series of experiments under conditions which would enable us to overcome these difficulties. Then, too, we were anxious to increase our fund of information regarding cases of relative immunity. The fulfilment of all these desires was secured through the hearty cooperation of first year students of medicine at the Columbia Medical School.

General procedure. Drs. J. Morgan Howe, G. S. Allan and J. K. Burgess, of the Institute, gave considerable attention in our laboratory to thorough oral examinations of about 70 of these students, and prepared clinical records of their findings in the case of each individual. There were no cases of pyorrhea or erosion among these young men. Our chemical studies of saliva from these particular subjects were accordingly confined to specimens from 17 selected cases of relative immunity and 13 selected cases of plain decay. We obtained saliva in each of these instances by the simple collection process described on page 74. No secretory stimulation was effected in any way. Contamination was carefully prevented. The students collected the saliva at their convenience during a regular four-hour morning exercise in physiological chemistry in our laboratory (from 10-12:30, usually), so that the external conditions of collection were practically the same in all cases. Quantities sufficient for the complete series of determinations could easily be obtained. As prospective medical men, the students readily caught the spirit of the investigation. Collection of saliva was not a new experience

TABLE II.

Specimens of Saliva Received from Dentists. Cases of Immunity.

Case No.	Consistence	Mucin	Solids per gram of Saliva	Ash per gram of Saliva	Acidity: c. c. of N/200 NaOH per 1 c. c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: signifies present + signifies absent +
			Mg.	Mg.			
5	Thin	2			1.1	30	+
7	Thin				0.9		
8	Thin	3	3.6	1.4	1.0	50	+
11	Thick				0.8	50	
12	Medium				0.8	40	
24	Thin	2			0.6	8	+
26	Medium				1.0	5	
27	Medium				0.5	25	
33	Thin				0.7		—
39	Medium	3	6.0	1.6	0.8	10	+
41	Medium	1.5	4.5	2.1	0.3	100	+
44	Thin	2			1.4	15	—
45	Thin	3	3.3	1.1	0.55	60	+
52	Thin	1	4.6	1.7	0.1	15	+
58	Thin				1.3		+
59	Thin	4	5.7	1.8	1.4	70	—
64	Thin	4	5.5	1.8	1.0	40	+
65	Thin	2	4.6	1.3	0.2	15	+
81	Medium	4	5.4	1.2	0.6	100	—
Average		2.6	4.8	1.5	0.79	40	

TABLE III.

Specimens of Saliva Received from Dentists. Cases of Decay.

2	Thin	2			0.65	10	+
3	Thick	4			1.5	50	+
4	Thin	2			1.65	30	+
9	Medium				0.8	10	+
10	Thin				1.3	50	
16	Medium	2.5	4.3	1.1	0.45	100	+
17	Thin	3	4.6	1.9	0.5	100	+
18	Thick	3			1.2	10	+
20	Thick	3	3.8	1.3	0.45	50	+
21	Thick	1			0.3	30	+
22	Medium				0.6	10	
23	Thin				0.4		
25	Thin				0.8	10	
28	Thin	2			0.45	100	
30	Thick	3			1.45	20	+
31	Thin	4			0.9	20	+
32	Thin	2	2.8	1.1	0.4	40	+
36	Medium	3			0.15		+
38	Thick	2	5.5	1.7	0.45	70	+
40	Thick	2	2.8	1.1	0.5	50	+
42	Thick	2			0.5	20	+
47	Medium	2	3.2	1.3	0.45	15	+
48	Medium	4	4.1	1.4	1.0	50	+
49	Thin						+
51	Thin				0.8	20	—
53	Thin	2.5	5.5	1.4	1.0	10	—
56	Thin	4			1.7	70	+
60	Thin	3			0.6		+

TABLE III (Continued).

Case No.	Consistence	Mucin	Solids per gram of Saliva	Ash per gram of Saliva	Acidity: c. c. of N/200 NaOH per 1 c. c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: signifies present + signifies absent -
			Mg.	Mg.			
61	Thin	3			1.2	10	—
62	Thin	4			0.8	60	+
68	Medium						+
69	Thick	2	5.1	1.4	0.1	80	+
74	Medium						+
75	Thick	2			0.1	60	
76	Medium				0.3	10	+
77	Thin	3	4.2	1.6	0.5	20	+
78	Medium	3	3.0	1.2	0.3	200	+
79	Thick	2	4.0	1.5	0.3	100	+
80	Thick	3			0.1	100	+
Average		2.7	4.1	1.4	0.68	48	

TABLE IV.

Specimens of Saliva Received from Dentists.				Cases of Erosion.		
13	Thick			0.7	8	
14	Thin			1.2		
15	Medium	3		1.2	100	+
16	Thick	2.5	4.3	1.1	0.45	100
18	Thick	3		1.2	10	+
19	Thick	3	4.2	1.2	0.4	8
23	Thin			0.4		
29	Thick			0.8		+
34	Thin	2.5		0.6	10	+
43	Thin			1.0	10	+
51	Thin			0.8	20	—
56	Thin	4		1.7	70	+
57	Medium	3.5	4.8	1.3	1.2	60
61	Thin	3		1.2	10	—
62	Thin	4		0.8	60	+
66	Thin	2	3.3	1.0	0.3	80
67	Thin	2	4.7	1.4	0.9	20
71	Thick	5		0.3	30	—
82	Thin	2		1.6	20	—
Average		3	4.3	1.2	0.88	38

TABLE V.

Specimens of Saliva Received from Dentists.				Cases of Pyorrhea.		
1	Thick	4		0.9	40	+
6	Thin	2	4.8	1.4	1.35	30
31	Thin	4		0.9	20	+
36	Medium	3		0.15		+
50	Thin			0.4		+
54	Thin	2	4.6	1.7	1.1	5
55	Thin	4		1.6	20	+
56	Thin	4				
63	Thick	3		0.8	20	+
70	Thin			0.9		+
72	Thick	1.5		0.5	20	+
73	Thin	4		1.7	5	+
82	Thin	2		1.6	20	+
Average		2.9	4.7	1.5	1.0	20

TABLE VI.
Specimens of Saliva Supplied by Medical Students. Cases of Relative Immunity.

Case No.	Consistence	Mucin	Solids per gram of Saliva	Ash per gram of Saliva	Acidity: c.c. of N/200 NaOH per 1 c.c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: + signifies present — signifies absent
			Mg.	Mg.			
83A	Thin	3	4.0	1.1	0.5	40	+
B	Thin	3			0.4	30	+
84A	Thin	3	4.6	1.4	0.9	50	+
B	Medium	3	5.4	1.2	0.8	40	+
85A	Thin	3	5.2	1.2	0.7	25	+
B	Thin	3	5.6	1.6	0.5	60	+
86A	Thin	2			1.2	10	—
B	Medium	2			1.0	10	+
87A	Thin	2			0.8	40	—
B	Thin	3			0.8	40	+
88A	Thin	3			1.0	10	+
B	Medium	3			1.0	10	+
89A	Thin	3			0.5	40	+
B	Thin	2.5			0.7	40	+
90A	Thin	2	4.1	1.7	0.5	30	—
B	Thin	2	3.6	1.4	0.8	30	—
103	Thin	2			0.9	30	—
104	Thin	3	4.4	1.4	0.7	50	+
105	Thick	4	4.5	0.8	0.8	60	+
106	Medium	3.5			0.5	50	+
107	Thin	2			0.7	15	+
108	Medium	3	3.0	1.0	0.5	60	+
109	Thick	3.5			0.8	20	+
110	Thin	1.5	4.7	1.7	0.8	10	+
112	Thin	2			0.9	30	+
Average		2.7	4.5	1.41	0.75	33	

TABLE VII.
Specimens of Saliva Supplied by Medical Students. Cases of Decay.

91A	Medium	4			1.0	8	+
B	Medium	4			0.45	8	+
92A	Medium	3	4.2	1.7	0.5	30	+
B	Thin	2	3.7	1.0	0.65	30	+
93A	Thin	3			0.6	30	+
B	Thin	3			0.5	30	+
94A	Thin	3	4.5	1.2	0.6	40	—
B	Thin	2.5	4.9	1.2	0.3	40	+
95A	Thin	2	4.3	1.4	0.5	30	+
B	Thin	2	4.7	1.7	0.4	30	+
96A	Thick	3.5			1.8		+
B	Medium	3			1.2	20	+
97	Medium	2	4.4	1.6	1.0	10	—
98	Thin	2	6.0	1.9	1.5	15	—
99	Medium	3	5.1	1.2	0.8	50	+
100	Thin	3	4.7	1.2	0.7	15	+
101	Thin	3			0.9	5	+
102	Medium	2			0.7	15	+
111	Thin	3	4.3	1.7	0.45	40	—
Average		2.8	4.6	1.44	0.76	23	

TABLE VIII.

A Summary of the Extreme Values and the Averages in Tables II to VII inclusive. (Table XII gives additional comparative data.)

A. Specimens of saliva received from dentists (pages 76 and 77).

a. Cases of relative immunity (Table II).

Mucin			Solids			Ash			Acidity			Sulfocyanate		
Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average
1	4	2.6	3.3	6.0	4.8	1.1	2.1	1.5	0.1	1.4	0.79	100	5	40

b. Cases of decay (Table III).

1	4	2.7	2.8	5.5	4.1	1.1	1.9	1.4	0.1	1.7	0.68	200	10	48
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c. Cases of erosion (Table IV)

2	5	3	3.3	4.8	4.3	1.0	1.4	1.2	0.3	1.7	0.88	100	8	38
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d. Cases of pyorrhea (Table V).

1.5	4	2.9	4.6	4.8	4.7	1.4	1.7	1.5	0.15	1.7	1.0	40	5	20
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B. Specimens of saliva supplied by medical students (page 78).

a. Cases of relative immunity (Table VI).

1.5	4	2.7	3.0	5.6	4.5	0.8	1.7	1.41	0.4	1.2	0.75	60	10	33
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b. Cases of decay (Table VII)

2	4	2.8	3.7	6.0	4.6	1.0	1.9	1.44	0.3	1.8	0.76	50	5	23
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for any of them. They cheerfully provided material in abundance. Unfavorable psychical influences were obviously absent from practically all these cases.

It is a great pleasure to acknowledge the very ready and

effective assistance that was given us in this work by the young men named below:

J. W. Babcock	Z. L. Griesemer	Harry Plotz
Ernst Boas	A. Gross	T. G. Robinson
J. H. Brothers, Jr.	W. B. Hetzel	Nathan Rosenthal
J. B. Casale	M. B. Kunstler	H. K. Sangree
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H. Chaplin	J. A. Loggins	W. C. A. Steffen
H. L. Dowd	D. A. Lubarsky	Richmond Stephens
H. J. Estrin	G. M. Mackenzie	E. G. Stillman
M. M. Feinberg	H. J. Muller	A. F. A. Wiggers
W. H. Gaul	W. G. Phipps	J. F. Williams

Analytic results. Tables VI and VII (p. 78) present the analytic data that are comparable to those obtained in the analysis of the specimens of saliva received from dentists (Tables II-V). The results that are indicated in these tables by A and B, respectively, were obtained on saliva from the same individual, in each case, but collected on different days.

The extreme differences among the results in Tables VI and VII may be seen at a glance in the summary comprising Table VIII (p. 79).

Special comparative determinations of mucin ("total alcohol-precipitate"). The opportunity to obtain an abundance of saliva from the medical students induced us to give further attention to the matter of mucin content, especially as our results had been emphasizing the probability that mucin plaques on teeth operate effectively in the inauguration of carious processes. (See page 67 of this paper and page 281 of our first paper).

In most cases, our determinations of "total alcohol-precipitate" (and the ash therefrom) were made with 15 c. c. or more of *filtered* saliva. The saliva was so abundant in each case that the desired volume could easily be filtered in a few minutes.

Filtration was effected in a closed apparatus to prevent change of composition by evaporation. The specimens were obtained under the uniform conditions specified on page 74 of this paper. The quantitative method described on page 68 was employed. The results of these analyses are summarized in Table IX.

TABLE IX.*

Comparative Amounts of Mucin from Saliva: Crude Mucin (Alcohol Precipitate) per 10 c. c. of Saliva.

I. Cases of Relative Immunity.						
Case No.	1st specimen		2nd specimen		3rd specimen	
	Dry	Ash	Dry	Ash	Dry	Ash
(New Series)	milligrams		milligrams		milligrams	
1	8	2.4	8	2.6	11	2.6
2	15	2.7	16	3.0		
3	10	1.6				
4	11	2.8				
5	15	2.5				
6	10	2.8	11	3.2		
7	10	2.4	9	2.1	10	2.1
8	21	3.5				
9	9	2.2				
10	11					
11	13					
12	18					
13	13					
14	12					
15	16					
16	15					
17	12					
18	16					
19	12	2.0	10	2.1	11	2.8
20	21					
Average	13.4	2.5	10.8	2.6	10.7	2.5
Average, all specimens: Dry, 12.8 mgm.; Ash, 2.5 mgm.						

II. Cases of Decay.						
Case No.	1st specimen		2nd specimen			
	Dry	Ash	Dry	Ash		
(New Series)	milligrams		milligrams			
21	13	1.5				
22	9	2.2	10	2.3		
23	20	3.3				
24	12	3.5	15	3.2		
25	16	3.2				
26	12	2.9				
27	16	3.1				
28	10	2.2				
29	17	3.6				
30	13	2.8				
31	10	2.2				
Average	13.4	2.7	12.5	2.7		
Average, all specimens: Dry, 13.3 mgm.; Ash, 2.7 mgm.						

VI. A STUDY OF SALIVA FROM A CASE OF PERFECT IMMUNITY.

Throughout this work we felt increasingly the need of an opportunity to study cases of *perfect immunity* from dental diseases. It was a matter for more than ordinary gratification, therefore, when, shortly after the presentation of our report to

*This was "Table 2" in our first paper (p. 273). It is given again for the sake of completeness in this presentation of the *details* of our work.

the Institute (May 3, 1910), one of our dental friends not only gave us the name of a woman of 20 (Miss D.) with teeth showing "perfect immunity," but also assured us that the lady would be a willing subject in a study of her saliva. We found Miss D. all that her dentist claimed. She cheerfully submitted to all the plans proposed for the study of her saliva, and throughout the whole period of examination gave evidence of sharp interest in everything that was done. We regret that we cannot publicly name one to whom we are so greatly indebted for scientific assistance.

Miss D. never paid special attention to her teeth. They were given an ordinary brushing daily, but otherwise received no treatment of any kind. Except for one thorough cleaning, no dental work had ever been done for her. No cavity had ever appeared in any of her teeth, which were beautifully formed, very white, and in perfect alignment and occlusion.

Miss D. entered into the spirit of the research so graciously, and with such obvious interest, that psychological disturbances were almost wholly excluded. Every effort was made on our part to reduce the personal annoyances to a minimum. During the day the collections were made in a private room in the laboratory, where Miss D. was free to do as she pleased. Our plan of collection enabled her to come and go during the day as her inclinations determined. Early morning and night collections were made by Miss D. at her home. The specimens that were collected at night were always treated with powdered thymol, in order to prevent bacterial modifications. Such specimens were brought to the laboratory on the following morning, and at once subjected to analysis.

Fairly abundant supplies could be furnished at all times. Miss D. was easily able to collect from 10 to 15 c. c. of saliva in any period of 15 minutes. The method of collection was the same as that described on page 74 of this paper. Each specimen was promptly subjected to analysis. The first six samples were obtained on three consecutive days in May, 1910, and the remainder on consecutive days a month later. Miss D. was perfectly well throughout each period of examination.

Our results are summarized in Table X. In Table XI the figures are grouped according to the periods of collection, the first six sets of data being omitted.

TABLE X.
Specimens of Saliva Secreted by Miss D.
A Case of Perfect Immunity.

Specimen No.	Date: 1910	Hour	Consist- ence	Mucin	Solids per gram of Saliva	Acidity: c.c. of N/200 NaOH per 1 c.c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: + signifies present — signifies absent
					Mg.			
1	5/11	11:00 A. M.	Medium	3		0.55	50	+
2	"	4:00 P. M.	Medium	3		0.6	60	Strong
3	5/12	8:00 P. M.	Thin	2.5		0.5	50	—
4	"	2:30 P. M.	Medium	2.5		0.45	60	Strong
5	5/13	8:00 A. M.	Thin	2		0.7	40	+
6	"	2:30 P. M.	Thin	3		0.5	60	Strong
7	6/13	*10:00 P. M.	Thin	2	3.4	0.45	40	—
8	6/14	6:30 A. M.	Thin	1	2.9	0.8	20	—
9		10:45 A. M.	Medium	2	3.3	0.5	25	+
10		12:45 P. M.	Thin	1	3.1	0.65	30	—
11		2:00 P. M.	Medium	3	4.1	0.75	30	+
12		3:30 P. M.	Medium	3	4.0	0.6	30	—
13		5:00 P. M.	Medium	2	3.5	0.5	30	—
14†	*	7:45 P. M.	Thin	2	7.4	1.7	30	—
15	*	9:45 P. M.	Thin	2	3.7	0.5	35	+
16	*	11:15 P. M.	Thin	1	3.5	0.7	20	—
17	6/15	* 7:00 A. M.	Thin	1	4.2	1.0	15	—
18		8:15 A. M.	Thin	3	3.4	0.7	25	—
19		10:30 A. M.	Thin	2	3.7	0.5	25	—
20		12:00 A. M.	Thin	1	3.5	0.5	30	—
21		1:00 P. M.	Medium	3	5.0	0.8	25	+
22		3:45 P. M.	Medium	2	4.3	0.55	35	—
23	6/16	2:15 A. M.	Thin	1	3.2	0.45	45	—
24	*	7:15 A. M.	Thin	1	3.3	0.4	25	—
25		8:30 A. M.	Thin	2	3.2	0.5	40	—
26		10:45 A. M.	Thin	2	3.5	0.5	30	+
27		12:00 A. M.	Thin	2	3.5	0.4	25	+
28		1:15 P. M.	Thin	2.5	4.3	0.6	25	Strong
29		3:30 P. M.	Thin	2	4.1	0.5	30	Strong
30	*	7:00 P. M.	Thin	2	4.3	0.5	50	—
31	*	7:45 P. M.	Thin	1	4.9	0.45	50	—
32	*	9:15 P. M.	Thin	2	3.9	0.4	60	—
33	*	10:30 P. M.	Thin	1	3.3	0.7	30	—
34	6/17	* 7:15 A. M.	Thin	1	2.4	0.85	30	—
35		10:15 A. M.	Thin	2.5	3.2	0.4	40	Weak
36		1:30 P. M.	Thin	2.5	3.9	0.7	40	—
37		3:30 P. M.	Medium	3	4.7	0.7	30	Strong
38	*	6:30 P. M.	Thin	1	4.0	0.65	50	—
39	*	7:45 P. M.	Thin	2	5.2	1.1	40	—
40	*	12:00 P. M.	Thin	2	4.6	0.65	20	Very
Average				2	3.7	0.62	36	strong

*Preserved with thymol.

†The reasons for the high results for the *fourteenth* specimen are unknown.

TABLE XI.

Specimens of Saliva Secreted by Miss D.
A Case of Perfect Immunity (Table X.).

Data are arranged in groups, on the basis of sameness in approximate time of collection.

Specimen No.	Day: June, 1910	Hour	Consist- ence	Mucin	Solids per gram of Saliva Mg.	Acidity: c.c. of N/200 NaOH per 1 c.c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: + signifies present — signifies absent
Collected on arising.								
8	14	6:30	Thin	1	2.9	0.8	20	—
17	15	7:00	Thin	1	4.2	1.0	15	—
24	16	7:15	Thin	1	4.3	0.4	25	—
34	17	7:15	Thin	1	2.4	0.85	30	—
Average				1	3.5	0.76	22	
Collected after breakfast.								
18	15	8:15	Thin	3	3.4	0.7	25	—
25	16	8:30	Thin	2	3.2	0.5	40	—
Average				2.5	3.3	0.6	33	
Collected in the middle of the morning.								
9	14	10:45	Medium	2	3.3	0.5	25	+
19	15	10:30	Thin	2	3.7	0.5	25	—
26	16	10:45	Thin	2	3.5	0.5	30	+
35	17	10:45	Thin	2.5	3.2	0.4	40	Weak
Average				2.1	3.4	0.47	30	
Collected before lunch.								
10	14	12:45	Thin	1	3.1	0.65	30	—
20	15	12:00	Thin	1	3.5	0.5	30	—
27	16	12:00	Thin	2	3.5	0.4	25	+
Average				1.3	3.3	0.55	28	
Collected after lunch.								
11	14	2:00	Medium	3	4.1	0.75	30	+
21	15	1:00	Medium	3	5.0	0.8	25	+
28	16	1:15	Thin	2.5	4.3	0.6	25	Strong
36	17	1:30	Thin	2.5	3.9	0.7	40	—
Average				2.7	4.3	0.71	30	
Collected in the middle of the afternoon.								
12	14	3:30	Medium	3	4.0	0.6	30	—
22	15	3:45	Medium	2	4.3	0.55	35	—
29	16	3:30	Thin	2	4.1	0.5	30	Strong
37	17	3:30	Medium	3	4.7	0.7	30	Strong
Average				2.5	4.3	0.59	31	
Collected before dinner.								
13	14	5:00	Medium		3.5	0.5	30	—
30	16	7:00	Thin	2	4.3	0.5	50	—
38	17	6:30	Thin	1	4.0	0.65	50	—
Average				1.5	3.9	0.55	43	
Collected after dinner.								
14*	14	7:45	Thin	2	7.4	1.7	30	—
31	16	7:45	Thin	1	4.9	0.45	50	—
39	17	7:45	Thin	2	5.2	1.1	40	—
Average				1.7	5.8	1.1	40	

*The reasons for the high results for the *fourteenth* specimen are unknown.

TABLE XI (Continued).

Specimen No.	Day: June, 1910	Hour	Consist- ence	Mucin	Solids per gram of Saliva Mg.	Acidity c. c. of N/200 NaOH per 1 c. c. of Saliva	Sulphocyanate: 1 in x thousands parts of Saliva	Nitrite: + signifies present - signifies absent
Collected in the middle of the evening.								
15	14	9:45	Thin	2	3.7	0.5	35	+
32	16	9:15	Thin	2	3.9	0.4	60	—
Average				2	3.8	0.45	47	
Collected before retiring.								
7	13	10:00	Thin	2	3.4	0.45	40	—
16	14	11:15	Thin	1	3.5	0.7	20	—
23	16	2:15 A.M.	Thin	1	3.2	0.45	45	—
33	16	10:30	Thin	1	3.3	0.7	30	—
40	17	12:00	Thin	2	4.6	0.65	20	Very
Average				1.4	3.6	0.59	31	strong

The general significance of the results of our study of Miss D's saliva is so plain that detailed discussion is unnecessary. Any opinion that immunity to caries is normally secured through the action of sulfocyanate receives no support whatever from the facts pertaining to Miss D's saliva. *The proportion of sulfocyanate in the average specimen of her saliva was about the same as that in the average specimen supplied by dentists from cases of erosion; was almost identical with that in the average specimen from cases of relative immunity among both the dentists' patients and our medical students; and was more than that for one series of cases of decay, while less than that for the other series of cases of decay.*

The specially noteworthy features of our results in this connection were the observation that Miss D's saliva was never "thick," and that, in harmony with that fact, the proportions of contained mucin and total solids were less than those in the average specimens of saliva in all other types of cases under examination. These particular facts accord with the opinions that mucin is a factor in the inauguration of carious processes and that it operates to that effect under conditions that favor its collection on the teeth. Thick saliva would appear to be more favorable for that result than thin secretions.

The average acidity of Miss D's saliva was practically the same as that of the specimens supplied by dentists from cases of decay.

An unexpected feature in the composition of Miss D's saliva was its average low content of nitrite, or, putting the same fact in other words, the frequency of negative findings in the application of the nitrite test. Discussion of the possible reasons for this result will be postponed for the present, but will be considered in a future discussion of the results of a study now in progress on the fluctuations in the proportions of salivary nitrite.

The data to Table XI show that the mucin content of Miss D's saliva was usually highest in the specimens obtained during the periods after meals. The total solids generally ran parallel in proportion with the mucin. The acidity was lowest as a rule in the specimens collected during the intermediate periods. The sulfocyanate was highest in proportion in the morning samples and lowest in those collected in the evening.

The foregoing conclusions, in this and the preceding sections, are supported by the data brought together in Tables XII, XIII, XIV and XV.

TABLE XII.

A Summary of the Extreme Values and the Averages in the Results of the Analyses of Saliva, from Cases of Relative Immunity and Perfect Immunity.*

**A. Specimens of saliva obtained by dentists from cases of relative immunity (page 72).
Table II, p. 76.**

Mucin			Solids			Ash			Acidity			Sulfocyanate		
Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average	Lowest	Highest	Average
1	4	2.6	3.3	6	4.8	1.1	2.1	1.5	0.1	1.4	0.79	100	5	40

**B. Specimens of saliva supplied by medical students showing relative immunity (page 75.)
Table VI, p. 78.**

1.5	4	2.7	3	5.6	4.5	0.8	1.7	1.41	0.4	1.2	0.75	60	10	33
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**C. Specimens of saliva secreted by Miss D. A case of perfect immunity (page 81.)
Table X, p. 83.**

1	3	2	2.4	5.2	3.7	0.4	1.1	0.62	60	15	36
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*See Table VIII (p. 79) for comparable data pertaining to cases of decay, erosion and pyorrhea.

TABLE XIII.

Average Data Pertaining to Specimens of Saliva from Cases of Relative and Perfect Immunity.

	Specimens received from Dentists	Specimens supplied by Medical Students	Specimens secreted by Miss D.
Consistence.			
Thin (%).....	63	72	75
Medium (%)	31	20	25
Thick (%).....	6	8	0
Mucin.			
Photometric scale	2.6	2.7	2.0
Solids.			
Per gram of saliva (in mg.)	4.8	4.5	3.7
Ash.			
Per gram of saliva (in mg.)	1.5	1.4	
Acidity.			
C. c. of N/200 NaOH solution per 1 c. c. of saliva.....	0.79	0.75	0.62
Sulphocyanate.			
1 part in x thousands parts of saliva.	40	33	36
Nitrite.			
Positive (%)	71.4	80	40
Negative (%)	28.6	20	60

TABLE XIV.

Data Pertaining to the Occurrence of Nitrite in All Types of Specimens of Saliva.

	Number		Percentage	
	Positive	Negative	Positive	Negative
Dentists' specimens.				
Relative Immunity.....	10	4	71.4	28.6
Decay	30	3	91	9
Erosion	12	4	75	25
Pyorrhea	10	2	83.3	16.7
Students' specimens.				
Relative Immunity.....	20	5	80	20
Decay	15	4	79	21
Miss D's Specimens.				
Perfect immunity.....	16	24	40	60

TABLE XV.*
General Summary of Average Data.

1. Eighty-two specimens of saliva received from dentists.
a. Data pertaining to consistence.

Degree of Viscosity	Immunity 19 Specimens	Decay 39 Specimens	Erosion 19 Specimens	Pyorrhea 12 Specimens
Thin (%).....	63	41	58	67
Medium (%).....	31	26	10	25
Thick (%).....	6	33	32	8

b. Chemical Data.

Constituents	Results	No. of Speci- mens	Results	No. of Speci- mens	Results	No. of Speci- mens	Results	No. of Speci- mens
Mucin (photometric scale).....	2.6	12	2.7	29	3	13	2.9	10
Total solids per 10 grams: (in milligrams)	48	9	41	13	43	5	47	2
Ash per 10 grams: (in milligrams)	15.5	9	14	13	12	5	15.5	2
Acidity: c. c. of n/200 NaOH solution per 10 c. c. ...	7.9	19	6.8	36	8.8	19	10	12
Sulphocyanate: 1 part in x thousands	40	16	48	33	38	16	20	9

2. Forty-four specimens of saliva obtained from medical students.
a. Data pertaining to consistence.

Degree of Viscosity	Immunity 25 Specimens	Decay 19 Specimens	
Thin (%).....	72	58	
Medium (%)	20	37	
Thick (%).....	8	5	

b. Chemical Data.

Constituents	Results	No. of Speci- mens	Results	No. of Speci- mens
Mucin (photometric scale).....	2.7	25	2.8	19
Total solids per 10 grams: (in milligrams)	45	11	46	11
Ash per 10 grams: (in milligrams)	14.1	11	14.4	11
Acidity: c. c. of n/200 NaOH solution per 10 c. c. ...	7.5	25	7.6	19
Sulphocyanate: 1 part in x thousands	33	25	23	19

*This was Table I in our first paper (pp. 267-8). It is given again in order to facilitate comparisons with the tables that present the *details* of our analytic work.

VII. GENERAL OBSERVATIONS.

The purpose of this paper, as stated on page 67, has been accomplished. A summary of the leading analytic results of the work was given on page 88. Additional results of importance, pertaining especially to the work on specimens of saliva from a case of perfect immunity, are summarized on page 87. Summaries of general deductions from the analytic results appear on pages 66 and 85. Further *detailed* comment on the results would be superfluous.

In our first paper we discussed "*the inadequacy of salivary analysis for the determination of causative factors in dental caries*" (p. 280). The detailed results give cumulative emphasis to our remarks in that connection. May not analysis of fractions of saliva be unproductive of results that explain carious processes for the same reason that the analysis of water from the mouth of a river might fail to show the cause of certain very obvious though gradual corrosive effects at particular places on its banks? Liquid agents of such local disintegrations might be generated continuously in small quantities at various points on the banks and, running over the banks into the river, might be not only changed in part by reactions with substances in the banks, but also attenuated by the river volume into proportions too minute for chemical detection in any ordinary specimen of the water taken at random. In such cases, we should wish to examine the water at or very near the point where the disintegration material entered the river, in order to secure more favorable conditions for the detection of the corrosive factors. Or, better still, we would make a chemical examination of the disintegration processes and products *at their sites* on the river banks themselves.

VIII. PLAN OF THE FURTHER WORK WHICH IS NOW IN PROGRESS
UNDER THE AUSPICES OF THE NEW YORK INSTITUTE
OF STOMATOLOGY.

We concluded our first paper with the following general remarks (pp. 283-4):

"Our data fail to show any definite relation between the general composition and qualities of a given fraction of saliva and the condition of the teeth of the individual secreting it. This fact has made it seem inexpedient to conduct a more detailed

inquiry at present into purely salivary features of leading types of dental disease processes. That the *systemic condition* of the individual is an important factor in susceptibility to dental caries is a conviction that we cannot dismiss. *Nevertheless, direct external attack upon teeth by microorganisms appears to be the most important single factor in the carious processes.* Mucinous plaques afford favorable conditions for such external attacks. We shall be glad, with your approval, to *project our further study along bacterio-chemical lines*, in the hope that much more light can be thrown upon the very interesting and important, though elusive, facts of dental decay. For the furtherance of that work we cordially invite your personal interest and professional counsel."

Last October, in response to a request for "a proposed plan for the immediate continuation of the study of dental caries," we forwarded the following memorandum to Dr. Howe, of the Research Committee of the New York Institute of Stomatology (dated Oct. 31).

Memorandum on plans for further work under the auspices of the Institute. General chemical study of saliva in typical cases of dental caries and in cases of comparative immunity to decay has failed to reveal significant chemical relationships. These negative results have led to the conclusion that if any salivary compounds cause decay, they must occur in saliva in proportions that are too minute at any moment for their chemical detection under the variable conditions of salivary secretion. It also seems probable that if such substances are continuously produced in very slight proportions during a long period of time, they may be cumulatively effective and sufficiently corrosive to disintegrate and puncture enamel. Such insidious changes could occur in, and under, the ordinary viscid and tenacious plaque formations, which, by affording a favorable ground for the lodgment and development of microorganisms, might be seats of continuous chemical action by small, perhaps infinitesimal, proportions of bacterially-produced enamel-destroying compounds (e. g., acids from carbohydrates).

Disregarding for the present certain possible relationships between decay of teeth and systemic conditions, it is proposed to attack the problem in the second phase of its study along the following main lines (I-VII):

I. Ascertain the most favorable conditions for the growth and cultivation of microorganisms connected directly or indirectly with the leading types of dental disease.

II. Determine the nature and relative quantities of the significant substances produced by such microorganisms (I) in the following media :

- (1) Normal saliva.
- (2) Mucin solutions.
- (3) Saliva containing dissolved or suspended carbohydrate, fat, protein and other food products.
- (4) Mucin solutions containing dissolved or suspended carbohydrate, fat, protein and other food products.
- (5) Common food masses subjected to ordinary mastication.
- (6) Suspensions of particles taken from the teeth after the completion of an ordinary meal.
- (7) Solutions of food acids and alkalies associated with various common nutrients.
- (8) Suspensions of powdered enamel in nutrient liquids.
- (9) Suspensions of powdered dentin in nutrient liquids.

III. Determine the solvent action of the important bacterial products (II) on the enamel and dentin of natural (extracted) teeth, for the purpose of identifying the most destructive agents.

IV. Establish the chemical and physico-chemical nature of so-called mucin, in order to obtain a better understanding of its possible chemical and physical influence in plaque formation.

V. Learn the physical and chemical conditions of plaque formation, from chemical and bacteriological studies of plaque scrapings as well as of artificial plaque cultures, by the "lamb broth method" and other processes.

VI. Study the action of food acids on the enamel and dentin of natural (extracted) teeth.

VII. Find suitable agents for the disorganization of existent plaques on tooth surfaces and for the possible prevention of plaque formation.

The foregoing plan presents merely a *provisional working program* and is open to immediate revision, as new facts and further knowledge afford a better understanding of the situation.

Shortly after this proposed plan was communicated to Dr. Howe the Institute requested us to proceed.

The foregoing facts are stated in this candid way in order that our work may be open to criticism by, and guidance from, dentists (and any others who may be interested), *while it is in progress*.

Since the work was resumed, various other desirable procedures have occurred to us. We shall be glad to receive suggestions at any time from any one who may care to communicate with us. The dental problems awaiting solution pertain to the most commonly occurrent of all diseases. They deserve and will require the most earnest and persistent study as well as the most ingenious and painstaking experimental investigation.

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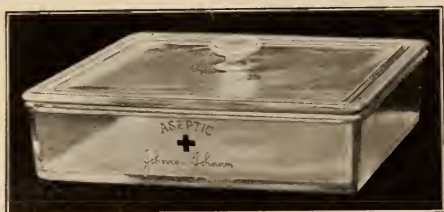
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A CHEERING SIGN OF THE TIMES.

It is a principle well known in the ancient art of husbandry that the pruning of unprofitable branches makes for the strength and symmetry of the coming tree. Mankind in its institutions has been governed by a similar rule. Outlying groups of savages found security in forming a tribe; when the time was ripe, the vitality of many tribes became the strength of a nation. The advantages of combination and co-ordination of interests in the advancement of civilization are too obvious to require more than a passing reference.

A gratifying instance of pruning, combination and co-ordination in dental society matters is about to be consummated in New York City. The Odontological Society, The New York Institute of Stomatology, and the Dental Hygiene Council are arranging to merge into the First District Dental Society of the State of New York. This association, which is the legal organization of its judicial district, has always stood among the influential societies of the country. The other bodies mentioned have contributed largely to our professional advancement. In the past, however, the separated interests have imposed a multiplication of duties upon the workers in these associations. Many men were busy in two or more societies, duplicating routine

work. The different organizations were often opposite camps, when precious time and strength were wasted in discord.

A general awakening has been followed by definite and creditable action. The large resources of the several important bodies will be employed in the upbuilding of a metropolitan society which should rank pre-eminent among local societies in the United States.

The scientific work is to be carried on by regularly organized sections, each one of which being specially equipped for its particular field. A section in Research, in Oral Surgery, in Oral Hygiene, in Operative Dentistry, in Prosthetic Dentistry, and in Orthodontia will hold frequent meetings. Post-graduate courses of instruction will be given by well-known operators. A general meeting of the Society will be held each month during the usual winter season.

It is somewhat early to speak in a definite way of the plans and scope of this prospective Academy of Dental Science, but all well-wishers of the dental profession will gladly hear that the first steps have been taken in this important movement.

W. B. DUNNING.

THE RETENTION OF ARTIFICIAL DENTURES.*

BY VARAZTOD KAZAURIAN, D. M. D., BOSTON, MASS.

Mr. President, members and guests of the Harvard Odontological Society, when I was told that I was to prepare a subject for presentation before you, I felt the desire, as all do, to offer something new and original. A very little consideration showed this to be impractical, as it takes years to evolve a new theory and verify it by clinical experience; so I decided to speak on a subject with which I had some familiarity, namely: The Retention of Artificial Dentures. In this I will give a general resume, emphasizing the especial points which I have found useful in my own practice. We will limit the subject to the retention of full upper and lower plates.

In constructing a denture, I consider four points, their respective value being, in my opinion, in the order in which I give them:

First—The substitution for the natural organs of mastication of the most useful artificial ones.

Second—The comfort and ease of the patient.

Third—Aesthetic value as regards color, facial lines, arrangement of the teeth, etc.

Fourth—Vocalization.

Shall we consider the first division, the substitution for the natural organs of mastication of the most useful artificial ones? The natural organs, by reason of their long roots being firmly imbedded in the bony framework of the jaw, are capable of withstanding a force of from one hundred and fifty to two hundred and fifty pounds pressure, which may be exerted in the process of mastication. An ideal substitute would be capable of withstanding an equal pressure without displacement. In this age of wonders, one would hesitate to say that this substitute is impossible to find, but no pioneer has as yet appeared to blaze the way. First of all we must bear in mind that retention is the essential element in a successful denture, we can, by observing the physical laws affecting retention, produce good results. In order to have a certain amount of stability, the laws of *adhesion*, *atmospheric*

*Read before the Harvard Odontological Society, October 10, 1910.

pressure, gravity and the action of *various muscles* must be considered.

As the plates are used in the function of mastication, the laws of *leverage* and *antagonistic forces* present themselves. We also must consider the mechanism of the jaw.

Shall we first review our definitions of these physical laws and see how closely we can apply them to the construction of artificial dentures?

Adhesion—Adhesion is the general name given to the bond between unlike molecules, that is, between molecules of different substances. When a glass rod is dipped into water, a thin film of the liquid spreads itself over the glass and the attraction between the two is considerable. We can measure adhesion if we balance a pane of glass so that its under surface is in contact with the surface of the water and then add weights until the glass is pulled away. In the same manner, light articles, such as pieces of tissue paper, feathers and the like, will stick to the hand and to one another. This force of adhesion is proportional to the areas and varies with the substances involved.

In artificial dentures the adhesion is between the surfaces of the plate and the tissues of the mouth. A perfect contact and uniform pressure is made possible by the saliva, which serves in making the joint and excluding the air.

By experimentation it has been proved that the adhesive force of different liquids is varied. To illustrate, a polished plate of agate, one inch in diameter, when in contact with the water, requires 25 grams weight to separate, sulphuric acid 29, lime 21, petroleum 16, alcohol 15 and ether 10. To the best of my knowledge no experiments have been performed on saliva. But it is reasonable to infer that different conditions of saliva have different adhesive force. Authorities claim that normal, thin, watery saliva is most favorable for retention.

A full knowledge of this physical force, its relation to different substances and a close study of the condition of the mouth will explain to us many difficulties that we meet every day. The vitality of the cells of the oral tissues is another important factor in adhesion. These tissues are, of course, subject to the general changes of the body. When the general system is robust and vigorous, the tissues of the mouth will be full and firm and the

plate will have its maximum retention, other factors being favorable, but, when the patient is debilitated and worn out, the tissues will be relaxed and flabby and the retention correspondingly poor. We sometimes wonder why we cannot give full satisfaction to very old patients, especially those with poor health. I think the explanation lies in the low vitality of the tissues of the mouth. We have stated that the prevention of air between the plate and the tissues of the mouth is a very essential requirement for adhesion. *Variation in surface density* is the greatest obstacle for successful retention, as this condition during mastication, plus the movement of the muscles of the mouth and cheek, causes uneven pressure and facilitates the ingress of air between the plate and the tissues in contact. Adhesion is dependent on good contact and uniform pressure at all points, but unfortunately most mouths are divided into hard and soft areas and, unless this fact is taken into consideration, it is impossible to obtain uniform pressure.

Atmospheric pressure is the weight of a column of air resting on a given object, and is a force which is exerted in all directions. As the tissues of the body have a gaseous tension exactly equal and opposite in direction to atmospheric pressure, we do not feel it ordinarily.

As the tension of the gases within the body is maintained by osmosis and is of necessity slower in changing than are the changes of atmospheric pressure, a sudden change of altitude, as in a balloon ascension, causes us to be painfully aware that our bodies are under pressure until the internal pressure has adjusted itself to external conditions.

This force is utilized in the retention of artificial dentures by the use of vacuum chambers, as, by their means, we are able to get a negative pressure inside the chamber and a positive pressure on the outside. According to the law of physics, the larger the area covered by the chamber, the greater the force of retention exerted by atmospheric pressure.

The practice of cupping in medicine illustrates very well the theory of the vacuum chamber. It has its limitations, for, as we increase the size of the chamber, we make smaller the adhesive surfaces and make the plate less stable by lessening the points of contact.

The next physical force to consider is gravity.

Gravity, as stated by Newton, is that every particle of matter in the universe tends to move towards every other particle in a straight line joining the two and with an intensity depending directly upon the product of their masses, and, inversely, upon the square of their distances apart.

This force is a positive factor in the retention of lower plates, but has to be considered negatively in uppers.

Lastly—Leverage and Antagonistic Forces. A lever consists of a rigid bar supported at one end called the fulcrum and capable of turning freely around this point. There are three possible arrangements of the fulcrum, pressure and weight, and this gives rise to three classes of levers. In prosthetes dentistry only the lever of the first class need be considered, that is, the one in which the fulcrum is between the power and the work. In a complete artificial denture the alveolar ridge is the fulcrum, the sum total of the various forces retaining the plate is the power, and the antagonism of the opposite plate acting through the bolus of food is the work.

Moreover, the laws governing the direction of energy have to be considered. "Energy moves in a straight line and at right angles to the surface from which the force emanates. In the line of energy there would be great resistance, but laterally there would be but slight resistance."—*Wilson*.

The problem of leverage and antagonistic force present themselves when we start to set up our artificial teeth. If the teeth could be set up inside the alveolar ridge, it would be impossible to dislodge them by force of occlusion. This is not practical, as we would be encroaching on the area occupied by the tongue. We must harmonize our different factors, and so set the teeth that there will be the greatest room for the tongue and the least leverage tending towards displacement. The law that force moves at right angles to the surface from which it emanates, should govern us in shaping and arranging the planes of the occlusive surfaces of the bicuspid and molars.

PRACTICAL APPLICATION OF THE PRINCIPLES.

1. The first essential in a case presented for an artificial denture is a thorough examination of the mouth, in which especial

attention is paid to the size and form of the maxillae, density of the tissues, etc. A careful examiner will be able to say with a good deal of assurance what the outcome of the dentures will be. If it is an ordinary case—I call an ordinary case one in which the patient has good health—the processes are not very much absorbed, the vault is of medium height and the soft tissues are of a pretty uniform density, a little careful attention to accepted methods is quite sufficient to produce satisfactory results.

After examination we select a tray. As a general statement a suitable tray would be one conforming in general outline to the maxilla and with a quarter of an inch space between the rim and the process,

We come now to impression material. There are two principal ones,—plaster and modeling composition, with plaster given the preference by the highest authorities. There are some serious objections to its use, especially in edentulous cases. There is an expansion to the plaster in setting which is apt to make some slight changes in the impression.

Although with plaster one is able to secure the most perfect impressions, it is necessary to consider that the surfaces of the maxillae are not of uniform density and that a plaster impression reproduces physical form alone, while what we desire is a reproduction of physical form under a pressure equivalent to the amount an artificial denture would exert. We may obtain this by a preliminary impression of plaster. After this has hardened, it is scraped out uniformly and an impression taken with a small amount of modeling composition, using this as a tray. Sometimes modeling composition is used for the preliminary impression and plaster is used in combination with it.

Our impression secured, we pour, separate, and trim our model, taking great care to preserve the muscle line.

DIFFERENT METHODS OF SECURING A PROPER BASE PLATE.

In order to approach this subject clearly, I will describe to you some methods of retaining artificial dentures in trying and difficult cases. The most difficult conditions presented are those in which a great deal of absorption has taken place at the alveolar process and has been replaced by soft and flabby tissue of varying density,—this in a patient of advanced years and lowered vitality.

To meet these conditions one would carve the model, re-

ducing the soft areas so the pressure of a denture would be met uniformly. Very often the median line of the roof of the mouth is hard. A thin relief of vacuum chamber metal is made, the muscular attachments taken into consideration and the outline formed.

An excellent method in a doubtful case is to vulcanize a base plate and try it in the mouth. If satisfactory the teeth are set and the case finished. If not, you repeat the process until you succeed.

THE CORRECTIBLE IMPRESSION METHOD.

This method is advocated by Dr. J. W. Greene. His aim is to secure an impression from which a model may be reproduced showing the mouth as it is under uniform pressure, and have a valve-like fit around the border of the plate.

This is done by taking a preliminary impression of Modeling Compound. This is trimmed at the rear to conform to the desired length of the palate, then by softening the part in contact with the roof and alveolar ridge he makes sure that he has perfect contact and uniform pressure. He next trims the muscle line, then brings the sides and front into close adaptation, completing one place before starting to the next. He does this by heating the area involved and pressing with finger, cheek and tongue until the desired result is obtained. It is cooled thoroughly before removal. The palate line is corrected in the same manner, and the impression should then stand the tests expected of a finished plate.

A method that I have been using for the past two years may perhaps interest you. For very hard cases it has been my last resort and has been quite successful. Take a plaster impression and pour a thin metal model, using a hard fusible alloy, Then make an aluminum base plate by one of the swedging processes. Try in the mouth and tream the base plate according to the muscular attachments, making it cover as much area as possible, without interfering with the muscles of the mouth. I do not expect to have a good adhesion when I try it in for the first time. I bear the idea in mind that, for a successful adhesion, the ingress of air between the plate and the tissues must be prevented, not only in a state of rest, but also under a varying amount of

pressure at different points. In other words, a good fit and uniform pressure at all points is my aim. Then, with an instrument which has long, curved beaks carrying a series of points, a ball-shaped one for one beak and a concaved mate for the other, I begin to bend the base plate at various points where, by examining the mouth, I find it can stand compression. I bend it as much as I can at the first sitting, then have the patient wear the base plate for two or three days. At the next visit I determine the stability of the plate by digital pressure. It is possible to see the points at which the air has ingress. I bend the plate until these points are eliminated, and the plate not only adheres, but remains undisturbed when subjected to pressure on the various lines of force used in mastication. Having reached this stage I feel practically certain of a successful plate. I show you the model of a hard case done by this method.

In doing this and other cases by this method, I have found that the soft tissues will stand a great deal of compression; that a plate carried as far back on the hard palate as possible without interfering with the movements of the soft palate will give better retention; that the sides as well as the posterior part of the plate are capable of standing a lot of pressure and bending; that wearing the base plate is an important factor in adapting the tissues of the mouth and the base plate.

Aids to Retentions. I should like now to discuss vacuum chambers, beads and extension of plates as aids to retention. As we have seen from our definition of atmospheric pressure, that force is utilized by means of a vacuum chamber creating a negative pressure at the roof of the mouth. This principle has been in use in dentistry for more than seventy years, but has been the subject of much discussion. The sustaining pressure is equal to the area of the vacuum chamber times the atmospheric pressure minus the vacuum chamber times the negative pressure. Theoretically, the sustaining force in a plate with a vacuum chamber having an area of three-quarters of an inch is about two and one-half pounds with the greatest exhaustion of air that is possible to obtain. A vacuum chamber soon fails in its usefulness, as the tissues soon fill it, whereupon the denture is held by adhesion. A vacuum chamber is at the best but of slight value, and, when

the tissue beneath it has become hypertrophied and has filled the chamber, the negative pressure disappears.

Beads. Adhesion is never perfect, unless there is an entire exclusion of air between the two surfaces. To secure this perfect exclusion, a continuous groove is made with a round-headed instrument in the plaster just inside the plate line. This enclosure will form a chamber of the entire inner surface of the denture that will greatly increase the adhesion. Beads are not practical in mouths where the tissues are very hard and unyielding, as they may cause considerable pain and ulceration. Care must be taken to make them round and smooth.

Extension of Plate Dentures. We know that the muscular movements of the mouth and tongue interfere greatly with the retention of the plates, but the same muscles could be utilized to good advantage by making a close study of their movements and making extensions on the plates at different locations.

It is possible to extend the distal part of a lower plate lingually to produce a projection which may be grasped by the tongue. The use of the so-called wings at the distal portion of the lower plate on the buccal side will help a great deal by letting the tissues at that area rest upon it.

Where it is permissible rims may be formed upon the buccal and lingual surfaces of both upper and lower dentures, which may be grasped by the cheek and lip muscles. In lower dentures it is necessary to so form them that they do not encroach on the space ordinarily occupied by the tongue.

LOWER DENTURES.

Lower dentures are somewhat harder to retain in the mouth. Gravity is the physical force utilized, although in very favorable cases we have adhesion. In the majority of cases the weight of the rubber plates is enough to hold them. In some very trying cases where the alveolar ridge is absorbed additional weight is of use. That is why various forms of metal dentures are invented and weighted rubber utilized. Although weight has the advantages, yet we must bear in mind that too much weight will not only be useless, but will cause a lot of discomfort to the patient and will hasten the absorptions of the alveolar process.

As a general rule the use of heavy plates must be our last resort after all the other means have failed.

SETTING OF TEETH.

A knowledge of the mechanism by which mastication is accomplished is essential for the maximum utilization of the artificial substitutes of these organs. The arrangement of the teeth, their physical forms, their relations to each other both in rest and in motion, the different movements of the lower jaw reveal to us the fact that nature has provided us with a very complicated mechanism.

Of all the processes in the construction of an artificial denture, the question of articulation is discussed most scientifically. Bonwell fifty years ago made the first contribution to anatomical articulation. Since then, Hayes, Walker, Snow, J. Leon Williams, Cross, Christenson and Gysi and many others have given the results of their investigations to the profession and have shown plainly that the old-fashioned way of arranging teeth on a plane of line articulation as unscientific and incapable of producing the best results.

Following closely the laws of leverage and antagonization we give our substitute not only a wider range of usefulness, but utilize the adhesive force already held by the plates to better advantage. If the teeth are set up without regard to the laws of leverage and antagonistic forces, the strain on the plates during mastication will be so great that they will be dislodged. On the other hand, the utilization of these forces will minimize the strain and will act as a positive force for retention.

Natural teeth are arranged on the alveolar process and, during mastication the force is applied along the roots of the teeth. In artificial dentures anatomical conditions of the maxillae are changed. The teeth must be set as nearly opposite the alveolar ridge as possible in order that there may be very little leverage.

"The balancing forces must be considered in the active side, that is, in the side performing the mastication." There is contact of all the teeth of both buccal and lingual cusps of the molars and bicuspid, while on the opposite side only the buccal of the lower last molar and the palatal of the upper are in con-

tact. And during incising action, when the lower and upper incisors are in contact at their cutting edges, there is also contact of the upper and lower molars on both sides. This arrangement will give a balancing force to the plates, which minimizes the strain on the adhesion.

Dr. Black and Dr. Head have made extensive experiments on the crushing force of human teeth on different foodstuffs. The former utilized the straight up and down movements of the jaw, and his figures show that different kinds of food will require from three to eighty pounds of pressure to crush. Dr. Head utilized a triturating as well as a crushing force. His figures were from one to forty pounds. These experiments give us several conclusions in the case of artificial dentures.

First—It requires much more force to utilize plates made on plane line articulators, as eighty pounds of force cannot be produced by adhesion by contact.

Second—A sliding motion being in harmony with the natural mechanism of the jaw, much less force is required for mastication.

Third—Teeth set anatomically will give less strain and more usefulness.

Fortunately, thanks to the exhaustive efforts of the advanced numbers of our profession, the setting of the teeth anatomically has been simplified very much; with the invention of simpler articulators combined with anatomical sets of teeth furnished us by some manufacturers, we have very little difficulty in arranging the teeth.

NO. 1 ENDING.

(I would summarize the various steps for securing the utmost retention possible in a full case as follows):—

First—Careful examination which will show hard and soft areas, muscle attachments, etc.

Second—An impression which will give the physical form of the mouth under a pressure equivalent to that exerted in mastication.

Third—A model trimmed with reference to hard and soft areas and if the oral tissue is soft bead it within the muscle line.

Fourth—Teeth set anatomically, so the forces of leverage

and antagonism will aid rather than detract from the stability of the plate.

Most of the steps followed by us in the construction of artificial dentures are empirical. Setting the teeth on anatomical lines is the only really scientific step at present. We hope that some day the whole operation will be scientific, but until that time we must follow accepted methods, paying careful attention to the physical principles involved.

If we follow these various steps carefully, we can turn the plates over to the patient secure in the thought that we have done the best that modern dentistry offers.

A NUMBER OF INTERESTING DEVICES IN SURGERY.*

BY R. H. M. DAWBARN, M. D., NEW YORK, N. Y.

I think I have rather a new idea here—at least one or two editors have told me so. There are about fifty very short essays—some of them only a paragraph or two, others a page or two—all boiled down to the last degree, with the ancient history left out—the results mostly of things that have come up in my experience as a teacher. The programme is to publish a few of them every few weeks, as a kind of serial; but in your case I am going to pay you the compliment of giving you some of them in advance of the rest of the profession. After I have read them to you, they will go—some of them to-morrow morning—to the editor of a medical journal for publication.

Looking into my bag here, I notice a couple of curiosities. If the word unique were applicable, I would say they are the most unique calculi I have ever seen. The first is the heaviest stone ever found in the human body—called the mulberry calculus—made of oxylate of lime, coming from the urinary tract. There is a loose stone inside of it.

I noticed this peculiarity at once when I removed it from the urinary bladder of the little child, and I have not found it duplicated in any museum in New York. I wrote to a friend in Washington, who inquired at the Marine Hospital, and also of the professors of genito-urinary diseases.

This exemplifies gratitude as it is sometimes found. The patient was a little Italian lad, nine years of age, recently landed, and for about a year past afflicted with this thing.

I heard of this case in a peculiar way. A servant of ours had a friend whom I went to treat, and I heard of this boy, who was living there with his family in the rear tenement. They lived in one room, six or seven children, with the husband and wife and grandmother. I said I would cure the boy and not charge anything for operation or the assistants. The operation was done, and the little lad was relieved. When I removed the stone, and the mother saw what had been the trouble, she seized my

* Address delivered before The New York Institute of Stomatology Tuesday, January 3rd, 1911.

hand and kissed it. That is an experience all surgeons have. It does not cost anything at all to kiss the hand. I said to the mother as I was about to leave: "Now I will take the stone." "Oh, no," said she. "I cannot let you have that. It belongs to my little Benvenuto. He made it in his bladder, and it belongs to him." After some haggling, I bought it from her for two dollars.

This next specimen resembles a huge pink and white pearl. It was polished, by Nature, in the gall bladder. A doctor living in Pelham Manor was seized in the night with agony. I made a diagnosis of gangrene of the gall bladder, and insisted upon operating at once. He said he thought it was chronic colic of the large duct. He did not want me to operate—did not even want a nurse. As it happened, I was right, and I have his gall stone and gall bladder, too—the latter with several black sloughs in its wall, ready to perforate. The gall bladder is not considered essential at all for our continued existence. A number of the longest-lived animals, for instance the elephant, have none. In mankind it is like the appendix and the tonsil—a striking evidence of the thoughtfulness of the Lord for the medical profession. I do not see how we would get along without them—some of us.

Here is an ordinary gall stone which would no more take a polish than a piece of chalk.

There are two very rare kidney stones, namely, cystin and zanthic oxide, which are the only ones of which no X-ray can be taken. The same is true of gallstone. The X-ray is useless in its diagnosis. In contrast to that, you see this beautiful pink color and polish here, upon the stone from that doctor's gall bladder.

The next thing my eye happens to light on is the metal, aluminum, which we use within the human body for splinting, in various ways. I will pass these things around for examination.

Here are three different things. This large cylinder of aluminum is like the small one, but I pried it open. It is used inside the marrow canal of broken long bones for splinting. You perhaps remember reading of the nephew of Judge O'Brien, who with a number of other young fellows had a little difficulty with an elevated post, as a result of which their automobile was wrapped once and a half around the post. The driver was killed, and this young man had twelve distinct fractures of various long

bones. I am about at the present time to take off the plaster of Paris splint from one of the limbs. I have had to shorten his right femur in the middle nearly two inches, and one of these cylinders, comfortably fitting the marrow canal, has been introduced. It was shoved down the full length, then slipped up one-half, and a short piece of this aluminum wire run through holes drilled transversely. The bone is beautifully splinted. Dr. Janeway, who is with us to-night, was present at the operation, and kindly assisted.

The way in which I came to take up the subject may interest you. About ten years ago, Mr. George H. Robinson, vice-president of the Gorham Silversmith Company—also dealing in aluminum, had turned out, by the hundred, aluminum soap dishes for travelers' use. Those soap dishes came back—also by the hundreds—with holes in them from the alkali of the toilet soap. When I was told that, it occurred to me that the human blood is also quite alkaline—not at all neutral—and I thought aluminum used for splinting would take itself out of the way, and perhaps we would not have occasional suppuration, by Nature trying to get rid of something and failing.

These aluminum splints do melt away in a year, or sometimes two years. I have used them as staples, and as plates with screws, in splinting fractured long bones.

Dr. Charles Elsberg took up the subject later on; but did better and more scientific work than my own, because he proved that the way in which the aluminum disappears is by producing a mild antiseptic called aluminum hydrate. This method of splinting has come to stay, we may be sure.

Now here are a half dozen things about anaesthesia, more or less new.

When an anaesthetist, giving major anaesthesia, gets interested in what the surgeon who is lecturing is saying, he is very apt to have his attention diverted—and that is very bad for the patient. There are a couple of ways of preventing it. One way which they use at Johns Hopkins Hospital is to have a sheet which comes down over the patient's chest, which prevents the anaesthetist from seeing, but not from hearing.

Here is a stethoscope. If instead of these short rubber tubes, rubber tubes two or three feet long be substituted that would be

all that would be necessary. Its distal end, or phonendoscope, is put on the naked chest over the heart and held there by crossed strips of surgeon's plaster. The other end enters the ears, leaving the hands free for giving the anaesthesia. Thus this assistant hears the heart and the respiration, and just as a man who is familiar with the microscope gets so he can concentrate what is in the microscope, seeing either what is in the microscope, and nothing with the other eye—or what is outside and nothing in the microscope—so the anaesthetist can concentrate his mind on either the heart or the respiration. But he cannot hear what the operator may be saying—which is a great safeguard to the patient.

Here is a most ingenious thing, devised by Dr. Stark, a prominent anaesthetist here, and is made by Ermold, Twenty-third Street and Third Avenue. It is a mouth gag through the hollow jaws of which to give chloroform. Without this we have to take away the chloroform or ether mask to go ahead with our operation, say, on the hard palate; but with this, anaesthesia and operation can both go on at the same time, thus rendering the total work much shorter.

I shall operate within a week on two cases of cleft palate. One of them is a perfect little terror, chloroform having such a momentary effect upon her. I can soak her until she is practically on the verge of danger—until I am afraid to give her any more—and in one minute after withholding the drug she is awake and screaming. Ether proves worse. With this device of Dr. Stark's, however, I do not expect any further trouble of this nature.

The next thing is rather new—Dr. Lombard's glass nasal tubes for anaesthesia. We hook them into the nostrils, hold them in place by a strip of surgeon's plaster, and pump the vapor right into the nose. There are three different sizes—for children or adults.

There is still another way of doing this thing that is simpler yet, using a couple of soft rubber catheters, and a three-way tube like a capital Y, which can be bought for a quarter. The catheters are fed back through the two nostrils to the larynx; and the anaesthetic vapor pumped in through the stem of the Y.

I am using at the City Hospital very largely, as I have for years, spinal anaesthesia. Those who have not seen that, I would be glad to welcome. I operate there three times a week, and very

commonly we do spinal analgesia. Even if you do not do it yourself for that purpose, it is worth being master of the situation for diagnostic reasons. Suppose you suspected fracture at the base of the skull. If you tap the cerebro-spinal fluid in the lumbar region and find it at all bloody, your diagnosis is made.

If you suspect spinal meningitis, you will withdraw fluid more or less milky; and then by microscope you will find the diplococcus of cerebro-spinal menengitis.

This plan is also ideal for injecting the antitoxins for lock-jaw. For ordinary operating I am using a two-grain dose of tropa-cocaine, in about a drachm of normal saline solution. That is obtained from the small leaf cocoa plant of Java. It stands boiling without decomposing, which cocaine does not. In nearly 400 anaesthesias with it, I have had no cause to regret giving it.

Dr. Bainbridge, of the Skin and Cancer Hospital, has given spinal analgesia even more times than myself, and says the same thing. Dr. Beer, of Berlin, in a recently published statement, says he has between 300 and 350 personal cases, and he considers it to be the safest form of anaesthesia, especially for the weak and the old.

A gentleman named Jennesco came over here to teach us what spinal anaesthesia is, a year or more ago. His method was to put the needle in the dorsal region, high up, and in two instances he is known to have irritated the cord. Strictly speaking, in the adults there is no spinal cord below the ribs. You can introduce the needle in any one of the four lumbar spaces with safety. The filum terminale covers the extent of the first lumbar vertebra; but this is not his, as the name shows, save its "terminal thread."

Here is my special apparatus for giving spinal anaesthesia, made by Ermold, of Twenty-third Street and Third Avenue. The syringe is graded in centimeters. You boil the whole thing. These needles are peculiar, in that they are ground almost at right angles with the ends—and thus cannot pierce any of the nerves there. One of the advantages of having the needles so slender is that the smaller the puncture in the spinal sheath, the less the tendency to have the fluid leak out, causing temporary headache.

Jennesco suggested strychnine with stovaine. Five or six years ago I tested stovaine, and did not like it especially. Stovaine is a synthetical compound devised by Fournier. He wanted

to exploit his discovery, and he gave it the name of stovaine—the word “fourneau” in French meaning “stove.”

This is the way Parke, Davis & Co. pack the new Novocaine and Adrenalin tablets. One in 15 minims makes a practical solution. The adrenalin makes the part where it is injected practically anaemic, and it is a great improvement on cocaine.

The other anaesthetic is a solution of quinine and urea hydrochloride. It is also made by Squibb & Co. as well as Parke, Davis & Co. It is put up in a 1% sterile solution.

Quinine and urea were injected to my knowledge even before I was a young graduate, by Loomis and others, as a desirable way of treating malaria, and why somebody did not discover that it caused local anaesthesia, many years before cocaine was discovered, I cannot understand.

I do not know but what this may be of value to you in your specialty, in our profession; for when injected the anaesthesia is usually maintained at least a hundred hours—in certain work within the mouth such prolonged benumbing would be useful.

There is absolutely no sequence of thought in these things. I will just read you a few of them as they come up.

Dr. Dawbarn read some paragraphs on the following subjects:

Never be pitiless.

Never lose your temper while operating.

Never try to prophecy.

The jugular vein.

On the relationship of the veins—above the diaphragm.

The seven essentials: When one rings up for a nurse, etc.

To hear or not to hear.

Three measures of safeguard against any major amputation.

For really hopeful results in surgery, make your diagnosis of bone early.

I know of one instance—so does Dr. Howe—of a patient sent to him from Mount Vernon—a young lawyer, who had had a second bicuspid on the upper left side treated by a dentist there. The dentist did not think anything remarkable about it, but the covering on the root of that tooth was soft, instead of being harder than stone. Dr. Howe suspected trouble and sent the case to me. I found his whole antrum was involved and the roof

of the mouth, which was not swollen or changed in appearance at all, but on that side the needle went through as if it were cartilage. The young man, now an eminent lawyer, is still alive. I excised his entire upper jaw, doing the Gross prize operation, and the sarcoma never came back.

Dr. Howe says that is fifteen or sixteen years ago, so that I guess he may be considered definitely cured.

Ask no questions of the operator.

The prime rule of plastic surgery.

Hope on—hope ever.

Upon gratitude to doctors.

Upon the two kinds of Caduceus.

You remember in Gray's Anatomy the picture of two snakes intertwined, and above it the dove—the Caduceus of Hermes.

AN INTERESTING CASE IN PRACTICE.*

BY T. W. ONDERDONK, D. D. S., NEW YORK, N. Y.

I wish to report a case that has given me more than the usual amount of trouble. Patient male, aged about fifty-eight, over six feet in height, weighing over two hundred pounds and has always enjoyed good health. Of marvelous strength, perfect teeth, no fillings except a few crown cavities filled a long time; one or two teeth missing, having lost them through poor professional advice in early life. Came under my observation in July, 1908, having just passed through a period of nervous prostration and was more or less a physical wreck. The mouth was in the following condition: Very sensitive to thermal changes, the gums receded some on all the teeth, leaving the cementum exposed for about a sixteenth of an inch on half of the teeth, some a little more. The gum tissue was firm and in a generally healthy condition, but seven of the teeth required filling above the enamel, and those not so much advanced were treated with nitrate of silver.

In January, 1909, another tooth was filled, the others treated with nitrate of silver. In July and August, 1909, more teeth were filled, eight in all. The teeth, being very sensitive, could not be excavated as fully as required, so were filled with amalgam and cement; after a few weeks these fillings were worthless and I was obliged to fill them over, this time using amalgam over a cement lining.

In March, 1910, another condition presented, the gums showing indication of trouble. In July the right inferior bicuspid loosened, extreme pain being caused by any pressure; it elongated and showed all symptoms of a devitalized pulp. I was so confident that I opened through the crown, but to my surprise found it very much alive. Used cocaine and pressure; removing the pulp, but there was no change of symptoms, pain continuing for some days. Got relief by using Colson's plasters and aconite and iodine with aristol. The trouble returned several times in the two months following, and in August, 1910, another tooth gave the same trouble. This one, having cavities around the

* Read before The New York Institute of Stomatology, December 6, 1910.

neck, I was more sure that this pulp must be dead, so opened through the crown only to have the same experience. A little later another tooth went through the same motions and I devitalized this with an open mind, it being very sensitive to thermal changes, and still another. In all these cases I found relief by free use of aconite and iodine with aristol.

I found all these cases started with food wedging, followed by a free use of toothpicks generating a very sore gum condition. To prevent this, when filling I obliterated the interdental spaces with the filling material, some with amalgam, others with gutta percha, with fair results, but late in August, 1910, came what I am pleased to call the climax. In the second case described the trouble returned with increased violence and the patient, being ill in bed with heart trouble, I was sent for to give relief. I did not know what to do, and in despair used the old remedies, but heat was intolerable, cold almost as bad. He being too ill to submit to extraction, as a last possibility I inserted a broach with a little cotton on it, thinking to force the medicament as far up as possible; to my surprise a hemorrhage set up and there was a drain of from ten to fifteen drops of stagnant blood, the evacuation of which was followed by comparative comfort. I presume there was such evacuation in the other cases. By closing up all possible places for food lodgment and by extra care the patient maintains a condition of comparative comfort. What was the cause of the trouble?

LITTLE TIME SAVERS; PRACTICAL HELPS IN OUR DAILY WORK.*

BY GEORGE A. WILSON, JR., D. D. S., NEW YORK, N. Y.

Since the programme of the evening has been largely of a practical nature, it will be in keeping, perhaps, if this paper follow along those lines.

We frequently hear quoted that short and truthful adage, "It is the little things of life which count," and it may have been the wisdom of the saying which suggested the title, "Little Time Savers," as one fitting and applicable to the thoughts herein expressed.

In this age of progression, with the trend of the times constantly leaning towards minute-clipping, time-saving devices and improvements, it seems imperative that we, too, catch the spirit in our own daily operations, for "minutes mean money," and to save time is to lengthen life,"

It is quite true that time is our chief asset and so we must sell this precious commodity at a price commensurate with our skill and ability, it behooves us to adopt such practical helps and advanced methods as are from time to time brought to our notice, for it is a noteworthy and evident fact that the patient today demands more of us than in years gone by.

In presenting these items, some of which have been so prepared that they may be passed for inspection, originality is not claimed. If, however, any one of them should prove helpful to those here, the recompense for this effort will be sufficient.

Enumerating briefly, mention is first made of the silicate cements—Ascher's preferably—for temporarily repairing a broken facing; pins are left in, the enamel of the right shade being pressed and moulded down upon them; finished and polished when hard.

If pins are torn away or lost, those very dainty and successful little gold screws, now made by the Steele facing people, can be quickly drilled and threaded to place. Facings put on in this

* Read before The New York Institute of Stomatology, December 6, 1910.

way give mouths of durability and the crown or bridge need not be removed.

The Steele repair outfit is also shown, constituting one of the most practical methods of the day for permanent facing repair, the bridge or crown unremoved, a Steele facing being used.

Dryness must be preserved in the use of these chemical porcelains. When the dam cannot be gotten on, a cotton roll, in conjunction with napkins,, placed under the cheek over the opening of Steno's duct near the upper second molar, saves much time and annoyance.

Gum-weeping may be controlled by a liberal coating of some one of the waterproofings on the market and a successful cervical filling gotten in without the rubber.

Slabs and spatulas used in the mixing of this silicate material can be cleaned in one-quarter the time if placed at once into water.

The water-proofed paper dental pad for the mixing of treatments, root-canal fillings, etc., a layer being torn off quickly, thus avoiding the washing and drying of slabs.

Small, padded, examination charts, going over the mouth once only, thoroughly, recording the necessary work and being guided by that thereafter.

The use of formaldehyde as an instrument sterilizer; leaves no stain or tarnish, and, being a concentrated solution, requires only a small quantity in water.

Alcohol, followed by glycerine, as an antidote for carbolic acid burns when accidentally gotten onto the lips; perhaps the only known medicaments approaching a remedy for such wounds.

Again, alcohol for removing iodine stains from hands or office linen; if taken early the entire stained surface can be whitened, no matter how extensive the spill.

If the hypodermic syringe be drawn partly full of alcohol before putting away, it will be found subsequently not only in working order, but sterile.

Here again are a few time-savers: Oxide of tin, a small box in the cabinet, which, with a leather disk on the engine, immediately gives a fine polish to gold, porcelain or vulcanite without going to the laboratory lathe.

Appointment slips in a pocket at the back of the appointment book, saving steps to desk or cabinet.

Bracket covers, Johnson & Johnson's output; kept in a handy place and changed quickly after each patient; they are clean and inviting in appearance.

Fellowship alloy, that one fine, nearly perfect product; quick setting, white in color and burnishable almost at once after inserting; producing fillings which are truly a pleasure to look upon years after.

The spirit lamp will give far less bother in lighting if the wick be turned low or the cap be put on after using.

The rough corners of a mass of temporary stopping or gutta percha can be made far more pliable to the tongue if smoothed with either of the solvents, chloroform or oil of eucalyptus from the cabinet.

Toothache can be almost entirely prevented if, in devitalization, the White Co.'s fibre be used well saturated with carbolic acid.

By placing in the end of a gold crown a small disk of carbon paper, the patient requested to bite, a mark is left on the tooth showing plainly the high point to be ground lower than the gold may go to its place under the free margin of the gum.

Numbers, instead of names, on the medicine bottles in the cabinet obviate the calling out to the assistant of objectionable sounding names, such as carbolic acid, peroxide, iodoform, chloroform and the like.

A convenient and aseptic form of local anaesthetic is the new sealed glass ampules, the point being broken off when it is desired to fill the hypodermic. They keep indefinitely and are clean and sterile.

It will no doubt be universally agreed that much time will be saved if our patients, particularly the ladies, be given the hand mirror after the operation rather than before or during.

A new article of apparent worth is the "gloss stick" quite recently put on the market, for the polishing of porcelain after grinding.

Going to the laboratory for a few moments before conclusion, mention is made of a few time-savers in this department of our work.

Chloroform, a solvent of wax; excellent for smoothing a

waxed-up case before sending to the vulcanizer; gives an even, glossy surface, saving much final scraping and finishing.

Again, chloroform for softening vulcanite from around tooth pins; left to soak for a time, the rubber can be picked out with a pin like so much cork.

Protection powder; a preparation for coating facings before firing, seeming to render them practically immune to checking.

A box of powdered borax from which the flux can be sprinkled upon the piece when too hot to be safely approached by the borax cream.

Wire gauze; a new investing ring material put out by the White Co., preventing the breaking apart of the fire clay, the meshes admitting of rapid radiation of heat as well as of quick drying.

A small piece of blue or indelible lead dissolved in the separating varnish gives an excellent guide to cut down upon in cast or model work.

Impression trays, when boiled in water containing a piece of common sapolio and a little ammonia, at once give up their adherent coating of modelling compound.

A gold crown can be very successfully repaired if a thin piece of platinum be held in place by sticky wax, applied outside, the soft investing material being poured within.

Platinized gold plate saves much time and trouble if used for backings, since its high fusing point insures against burning and consequent loss of the piece.

It is frequently found to expedite matters if a box of ready-to-use suction chambers and small-headed nails is kept handy, a sample of which is shown. Obviates cutting and making for each case.

In concluding, it has been recently and humorously remarked that "most papers begin with an apology," but honored precedent has been broken in this instance, the excuses coming at the close.

Apologetically, then, it is admitted that there has not been disclosed in this paper any startlingly new or monumental devices such as Panama Canals, Lusitanias, Hudson River Tunnels, flying machine or the like, clipping days, hours and minutes from

former schedules; but just a few of the "little things" along our daily pathway—trifles, they may be called.

Turning back, however, over the time-worn pages of literature, we can still read those immortal words of that once great mind who said:

"Trifles make perfection,
But perfection is no trifle."

THE TREATMENT OF PYORRHEA BY INSTRUMENTATION.*

BY NED A. STANLEY, D. M. D., NEW BEDFORD, MASS.

Mr. President and Fellow Members of The Institute of Stomatology:

It is with a slight feeling of timidity that I appear before you to-night, inasmuch as you have recently had a paper or talk on this line of work, together with a paper by one of our most scientific men, Dr. G. V. Black, read recently before the Second District Society.

I have called the subject of this paper, "The Treatment of Pyorrhea by Instrumentation," because it is the treatment I am familiar with, and the one I believe in for the correction of this affection; because, as a preliminary to systematic treatment, thorough instrumentation is insisted upon; and finally because I believe that less than three per cent of the cases so treated require anything further than an application or so of some of the various local remedial agents. I shall not attempt to go into an exhaustive analysis of the etiology of pyorrhea; that has been done by men eminently well qualified to speak; yet there are differences of opinion, and perhaps will be for a long time to come.

I prefer, however, to rely upon men whose manipulative skill and clinical experience, extending over a period of years, enables them to speak with authority, and the few words I offer to-night are given with the idea of stimulating those who have given battle and gone down to defeat in their own efforts to treat "pyorrhea alveolaris."

For this bane of the profession is curable. Pyorrhea is something I have tried to treat from the very early days in my practice. But I never treated a difficult case when I felt satisfied that I had done all that could be done with instruments. Yet I did the best I was capable of with the various scalers at our command, and relied upon astringent gum washes, local applicants

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galore, a system of sprays, and about everything considered especially good for this treatment.

But not until I secured this very comprehensive set of little planes, of which I will speak more in detail later, and became more or less proficient in their use, did I begin to obtain the results I had been striving for all these years. The first time I saw the instruments I recognized the possible results if one could become expert in their use. I have used them now nearly three and a half years, and feel almost constrained to say, at the present time, that whoever treats pyorrhea successfully must come to these instruments.

Briefly, what constitutes a cure?

In talking with competent men on this subject, a common query is, "Can you make the gum come down again?" This is, of course, impossible, since the peridental membrane, or any portion of it, when once destroyed, *is gone for good*; and to arrest the progress of this destruction and restore the parts to health must constitute a cure.

Any irritant of whatever nature that interferes with the integrity of the gingival margin, or is prejudicial to function may cause pyorrhea, says John Dean Patterson in substance; and if so, what more logical deduction can be drawn than that pyorrhea is a contributing if not a primary cause rather than the expression or symptom of a constitutional disorder. Authorities differ as to which of several of these causes exert the more baneful influence. *The pericemental life of the tooth is of vastly more importance than is the pulp life*, because through the maintenance of this rests the foundation of the dental structure.

In so far as we depart from the normal, conditions at once become more prone to disorder and offer less resistance to destructive agents, all of which as if native and to the manor born; and rendered more prolific in possibilities by unremitant exercise, seek the destruction of the peridental membrane and the adjacent process. Like Tammany, they are at work while you and I sleep, and no matter how good our intentions—an honorable outwork—may be, they, too, frequently obtain complete control of the citadel.

The maintenance of the approximal surfaces is absolutely essential to the elimination of one of the great causes of pyorrhea.

These contact points must be established to prevent the introduction and lodgment of food particles. The distal surface of the second molar frequently invites attack because of a malposed third molar. A condition, seldom specifically alluded to, is occasionally seen where one side of the mouth presents functional disturbance extending over a considerable area, due wholly to the habit of chewing on one side to the neglect of the other side. Searching examinations should be frequently made, and surgical treatment rendered in the incipient stage. With advancing years comes the tendency of the gums to recede, and this is sometimes in evidence long before the patient is thirty, and we cannot be too alert in our watchfulness, especially in the region of the molars and bicuspid, for it is here where the first indication of pyorrhea often manifests itself. As Dr. Hartzell has said, we should examine the teeth as carefully at the gum margins as if we were exploring for cavities; and wherever loss of tissue has taken place, the necessary surgical treatment given, which is planing the denuded surface of the tooth, and leaving healthy, soft tissue.

The symptoms of pyorrhea are quite misleading at times to one unfamiliar with the manifestations occasionally complained of, and especially so to our medical brethren.

For instance, a patient whom I had not seen for a long time had suffered for months from neuralgia on the right side of the face. She had been under a physician's care without obtaining relief, and finally decided to visit her dentist and see if the teeth were all right, as she expressed it. An examination showed a molar and a bicuspid afflicted with pyorrhea. I said to the patient: "There is a possible cause for your neuralgia; at any rate, the teeth need treatment in order to preserve them." An appointment was made, and these two teeth very carefully and thoroughly planed. A week later the patient was in and said she had two very sensitive teeth, but the neuralgia had entirely disappeared, as subsequently did the sensitiveness from the planing with nitrate of silver applications and a little time. There was undoubtedly an infection which caused the whole trouble.

Again, a patient complains of tooth ache, real, good, genuine tooth ache, such as we find from a decayed place or a dying pulp, a different pain than most of us are apt to associate with pyorrhea. The tooth may be perfectly sound so far as decay is concerned;

then we start for the pulp, soon to discern with the aid of the patient's conviction, that the pulp is probably in normal health. Manifestations like these, though rare, may come from pyorrhea but little advanced from the incipient stage.

A case which was both baffling and stubborn was that of an unusually robust man about fifty. I had treated his mouth for pyorrhea, several of the teeth being quite badly affected.

Some months later he complained of a bad taste as coming from around the upper incisors, shifting from one to another at times, but pretty constantly present.

No pus could be found, and repeatedly did I satisfy myself that no pocket existed around these teeth. Local applications of about everything from Head's Solvent down, were used, but in the end the "bad taste" cleaned them out and was master of the situation once more. Finally a pain developed in one of the centrals and was so persistent that the pulp was removed. A similar experience and treatment soon followed with the other central. Temporary benefit was the result of this, but more, I think, through the psychological than the pathological aspect of the case, as this feature was quite in evidence.

The patient, who was an intimate friend of a noted nose and throat specialist, let him look at his mouth. He explained it all—from his standpoint, and proceeded to treat with local applicants, the last of which was trichloroacetic acid every other day for a month. But the "bad taste," like a whiff of limburger cheese, "came back," as did the patient, saying that I must find the cause. So I rolled up my sleeves this time.

I finally forced a small, straight, sharp-pointed instrument between the process and tooth on the labial surface of the right central to a point about midway between the apex and the gum margin; and there I found that "a certain convocation of politic worms were e'en at him," "where he eats" as well as "where he was eaten." A pocket *did* exist, something like those rare cases of pericemental abscess.

The external appearance of the gum had shown no indication of this.

The affected portion was planed, and, as I felt sure, cured; but after a more extended sojourn from home the "bad taste" put in its appearance again; in a less virile form, however, and

again I went for the bottom and sides of that pocket, and after due time—pluss, Mr. B. T. cast his shadow over the scene of his former triumph.

To what extent the psychological aspect entered into the case I am unable to say.

One time during an absence from the city, the patient felt as though a little something was necessary and consulted a brother practitioner, who informed him the tooth was all right, but the gum needed stimulating, and recommended the use of the vibrator, when lo, with the laying on of the vibrator, and presto, another miracle had been wrought.

Another condition very frequently met with are those cases of retreating gums, usually occurring on the buccal and labial surfaces of the teeth, with no apparent cause; gums look healthy, teeth are firm, and yet there is much loss of membrane and process, and great concern among our lady patients thus afflicted. These cases have been designated as dry pyorrhea. A destruction of tissue is taking place from some cause or other. There must be a rim of dead or dying membrane which should be removed, and this portion of the tooth surface planed, thus removing the germ-bearing area. It can be likened to a surgical operation; you remove the dead or dying tissue, and the parts return as nearly as possible to their normal condition and function.

These cases are certainly easy to detect and simple in their treatment, when once the fundamental idea of a surgical operation has possession of the operator.

The simplest of things, as you know, are oftentimes the most illusive of comprehension. It has taken centuries of time and millions of victims before the simplest of all treatment bids fair to check the ravages of the great white plague, and this has come in our day. Prophylaxis—the most important thing in dentistry—is but slowly making its way to the place it should hold in every man's practice.

This effective measure will not only prevent pyorrhea in a great degree, but tooth decay as well, and is absolutely essential in maintaining the healthy condition of the gums after pyorrhea treatment. It is my practice to see the patient at intervals of a month to six weeks for prophylaxis following this treatment. I have found in all but a few extreme cases that the parts soon offer

greater resistance and the time between visits gradually extended.

Do you know that sometimes the accumulation of a little tartar is a gratifying sight, especially have I noticed this on lower incisors that have been planed, and the gums in close contact with the teeth once more. The lime deposits will form just to the restored healthy gum margin, and not beyond, just as it did before pyorrhea had developed.

Another important item necessary to the permanency of this work is the daily care the mouth receives. Some will give time and thoroughness which is always accompanied with beneficial results; while others are less faithful, and still those who are quite neglectful.

We can only preach and insist upon the need of co-operation in the work. I have tried to incorporate in this short paper a few helpful suggestions that have been borne out repeatedly in my own experience.

And now a few words about the instruments.

Several different men have contributed to the production of these instruments, and from Dr. Hartzell I learn that the curved plane head was invented by Dr. George Howe Winkler of New York, who obtained a patent upon it. Fifteen years or so ago Dr. Charles W. Jones of St. Paul, in a paper published at the time, advocated the centering or balancing the cutting edge in direct line with the long axis or handle of the instrument. Dr. Black also advocated this same thing.

The making of the instruments in pairs for the four sides of the tooth has been utilized for years, as has the sharpening of the instrument to prevent too deep cutting. Dr. C. M. Carr amplified ideas already well known and long in use, and contributed additional sizes and pairs of blades.

Dr. Thomas B. Hartzell has classified the instruments in such a manner that their selection for use is simple, and has modified the curvature of the smaller blades.

When a board is to be made smooth, it is usually done so with a plane instead of a scraper or file. In treating pyorrhea a man should have the best instrument made for the work, the one with which the most thorough operation can be performed.

This case of instruments was made by Dr. Thomas B. Hartzell of Minneapolis, and is probably familiar to many here to-

night. The cutting edge of each instrument is a miniature plane and is always worked with a pull motion.

The wrist or shaft is of the flat type, and is straight, convex, concave and of different angles to fit the different surfaces of a tooth. They are arranged in groups of eight, four pairs of opposites; each group is lettered, and each instrument numbered to correspond to the different surfaces of a tooth; and to understand these eight instruments thoroughly, you have the key to every group.

Gentlemen, pyorrhea will never be cured by selective medicaments, vaccines, systematic treatment or by the man who does not grasp the subject with his finger tips as well as with his brain.

CLINICAL STUDIES FROM CASES IN ORAL SURGERY.*

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In the practice of every professional man who treats diseases cases occur that are of more than a passing interest because of the fact that they are either unusual in themselves, or that they present features that are not commonly seen in a typical case of a given disease. There are many men who maintain that there can be no such thing as a typical case; that every case has its individual peculiarities and that each case ought to be treated with that point in view. This attitude is commendable, for it tends to prevent the practice of either medicine or dentistry from becoming mere routine, but, nevertheless, we must recognize the fact that certain groups of symptoms are characteristic of certain diseases, and that we must have a standard or type case as a starting point. The cases that do depart from the typical are frequently baffling and difficult to diagnose and hence difficult to treat intelligently. Let me say just here in passing that careful reporting of troublesome cases, with their successes or their failures may be of great service to others. It is to be regretted that we as dentists do not more frequently report cases that have proven to be of interest or that have possessed difficulties or marked peculiarities. In this paper it is my purpose to present a few cases that have interested me and which perhaps are sufficiently atypical to make it worth while to discuss them for a little while from a clinical aspect. I have divided the cases into three groups, each group having a common etiological factor, but the cases in each group varying in their subjective and objective symptoms. The first series of cases has as a cause of the symptom produced in the patient what is sometimes known as a non-erupted tooth, but what I prefer to call an imbedded tooth. Before reporting the cases themselves it may not be amiss to make

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a few general remarks in regard to these teeth which I term imbedded. *First*, our literature is sadly lacking with reference to the whole subject, including etiology, pathology, clinical symptoms and treatment. Garretson barely mentions that such a condition exists. Our modern authors of dental books have avoided the subject altogether so far as I have been able to discover. Dr. Upson, Professor of Diseases of the Nervous System in Western Reserve, in his book "Insomnia and Nerve Strain," dwells at some length on the effect produced by imbedded and impacted teeth on the nervous system, and presents some interesting cases. The subject, however, is treated from the medical aspect entirely. A review of the dental journals for the last few years discloses only an occasional case reported.

Secondly, our nomenclature is unscientific, or possibly it would be nearer the truth to say we have none, for we have no terms which differentiate the condition of a tooth normally unerupted (as, for example, a second molar at the age of ten years) from a tooth which is abnormally unerupted, as, for instance, a cuspid at thirty, or a molar at fifty years. For my own convenience, and for sake of clearness I use the terms *unerupted* and *imbedded*, the former indicating a normal condition and the latter an abnormal one. Having in mind, then, this distinction, let me say that it is imbedded teeth with which we are to deal in this paper.

The Etiology of this condition is frequently not difficult to see, but, on the other hand, many times even after careful study, I have been unable to get even the slightest hint as to what caused the failure of the tooth to erupt. To illustrate, in a mouth which is small and the teeth very much crowded, it is easy to see that the problem is a mechanical one and that lack of space may easily prevent the eruption of a tooth like the third molar. On the other hand, it is not easy to trace the cause of an imbedded tooth which occurs in an edentulous mouth and one which has been in that condition for years. The explanation, however, that lack of space is the cause of many imbedded teeth by no means clears up the matter, if we are seeking fundamentals; for we naturally ask next, what caused the lack of space?

Insufficient development, we say. This brings us to ask what causes the lack of development. This question immediately

plunges us into a sea of discussion which might well be subject matter for a whole book, for the factors which have their influence in retarding the development of the maxillae, together with the other bones of the head and face are almost without number. It is not my purpose further to discuss at this time this phase of the subject. In addition to the mechanical causes brought about by lack of space, which is the most common factor, probably, in causing imbedded teeth, there are other influences which have a decided effect. Local infections, with abscess formation, which may have an influence on developing teeth, and injuries which bring about an atrophy of the formative organ may be causes. General diseases, syphilis, the exanthemata, and mal-nutrition I have regarded as etiological factors in some cases. As I said a moment ago, the most painstaking care and study will not reveal the cause many times. The tooth which I have found imbedded most frequently is the third molar, especially that of the lower jaw, although the superior third molar is very frequently found in that condition. Next in order is the cuspid, followed by the bicuspid. Occasionally we find a lateral or a first or second molar imbedded. I have seen but one case of an imbedded central incisor.

The Pathology may vary all the way from a simple *hyperemia* or a *non-inflammatory* thickening to an acute inflammation with abscess formation. Rarely we see a neuritis.

Diagnosis is easy with the help of the X-ray. A radiograph will clear up the diagnosis many times, when there is doubt as to what is the cause of the symptoms of which the patient is complaining. A radiograph is not always necessary, however, and it is very convenient, when an X-ray is for any reason impossible, to be able to make a diagnosis by the sense of touch to the probe or sharp instrument as was developed (before the discovery of the X-ray) by the earlier operators like our beloved Fillebrown.

Symptoms.—Many times imbedded teeth produce absolutely no symptoms whatever and earlier in the paper when I explained that I used the term imbedded to express an abnormal condition, I meant simply, abnormal in that the tooth had failed to erupt long after the normal time for eruption, and not that the tooth itself was necessarily producing symptoms in the patient. The symptoms both subjective and objective that do occur may perhaps

be more interestingly presented by the citing of cases. The first four I wish to present are strikingly similar in some respects and yet the symptoms of which the patients complained were very different. The patients are all women past middle life and all edentulous from twelve to twenty years.

Case 1.—Woman, 52 years. Had worn an upper rubber plate for several years. Six months previous to the time I saw her in the Surgical clinic of the Harvard Dental School, she noticed a reddened spot in the vicinity of the left cuspid, which was not painful, but was tender to pressure. Her local dentist applied iodine and prescribed a mouth wash. No improvement being noticeable after several visits, she consulted another dentist, who made diagnosis of necrosis and treated her for a few months until she became very much discouraged and she was sent to Boston. When I saw her first, there was a small greyish area of sloughing tissue on the buccal side of the alveolar ridge in the vicinity of the upper left cuspid tooth. This greyish area was surrounded by dark turgid tissue, outside of which was an area of acute inflammation which gradually faded out into the surrounding tissue. *There was no pus* and no odor. The tissues at this point were moderately tender to pressure. Examination with probe revealed a smooth hard structure underneath the soft tissue which was not sensitive. Diagnosis was made of an imbedded tooth and under anaesthesia a cuspid tooth was removed. Part of the crown had been burred away in the treatment she had been receiving.

Case 2.—Woman, 65 years. Edentulous and wearing two plates twenty years. For five weeks previous to my seeing her she had suffered severely with pain along the lower portion of the left side of the face. Pain occasionally darted upward and became frontal. During these weeks there was no local disturbance except the pain. There was no swelling and she wore her plates as usual. To the physician who treated her there seemed to be no cause for the pain. Twenty-four hours before I saw her she noticed in the lower left incisor region a tenderness and she thought it was slightly swollen. The swelling had become quite noticeable by the time I was called in. Examination revealed a hard smooth surface under the soft tissue. There was slight discharge of pus. Diagnosis was made of an imbedded tooth,

and under Somnoform a cuspid tooth was removed, which relieved her entirely of her symptoms with practically no further treatment.

Case 3.—Woman, 55 years. Edentulous 16 years. Awoke one morning and found right side of face swollen. It was not painful in the least, but was tender to hard pressure. The swelling increased in size, and became more tender, but no evidence of pain. The fourth day after the first symptoms appeared I saw her in the Surgical clinic. Examination revealed a hard swelling on right inferior maxilla in molar region. There was no fluctuation. As in the other cases, a hard, smooth structure was felt under the soft tissue. An incision was made along the ridge under general anaesthesia, and a malformed first molar tooth was removed. There was some calcification of the peridental and periosteal membrane, so that the removal of the roots was attended with some difficulty. The swelling disappeared after the immediate effects of the operation itself passed away, and she experienced no further trouble.

Case 4.—Woman, 60 years. Had been wearing an upper plate several years. For two years she had been troubled intermittently with swelling on right side of superior maxilla in vicinity of cuspid region. Pus discharged on palatal side of alveolar ridge. There was pain at the times when swelling occurred, but none between attacks. She had been treated by two dentists, one of whom opened the sinus and burred it out and curetted the whole tract. Temporary improvement was noticed, but swelling recurred. It was lanced on buccal aspect twice or three times. She was brought to me by her dentist for consultation. I took a radiograph which revealed an imbedded tooth lying in a semi-horizontal position. This was removed from the palatal side without badly injuring the adjacent parts, so that she is wearing her same plate with comfort and satisfaction.

In studying these cases together, it is interesting to note the cases are similar in that, *first*, the patients, all women and past middle life, were edentulous, and wearing full plates; *second*, that while the cause of the symptoms of which they complained was the same in each case, namely, an imbedded tooth, yet very different symptoms were produced in each. In the first case there was nothing more locally than an inflammatory reaction with some

tenderness. The second case had very severe pain for a few weeks with no local reaction whatever to indicate what was producing the pain until finally the swelling appeared. The third case with the sudden onset of the swelling and the absence of pain, even when the swelling was well advanced, presents a quite different picture. The fourth case giving a history of attacks of swelling, discharge of pus and well marked pain, followed by entire cessation of symptoms save for slight discharge at times, gives us still another variation in effect. Another point of interest is the fact that in the case where there was the least local disturbance, the general symptoms were well marked, and were really an important part of the case. The effect produced on the nervous system was a mental depression, which became almost melancholia. This patient actually suffered more than the others, even though her local symptoms amounted to very little. Upson, to whom I referred earlier in the paper, calls attention to this far-reaching effect of both imbedded and impacted teeth on the nervous system, and shows that cases are by no means rare of various disturbances of the mind, from simple depression even to the graver forms of insanity due to these causes. I cannot in this paper discuss what produces these nervous symptoms. Briefly, however, it may be said that pressure on nerve structure and worry are two very prominent factors. In the case I have already cited and in one which I will cite in a moment, the nervous and mental symptoms noticed in the patients probably were due more to worry over themselves and their health than to any effect of pressure.

Case 5.—Man, 87 years of age. He had been operated on three or four times in as many years by surgeons of repute for a swelling on the left inferior maxilla located in the molar region. There was pus constantly discharging; at times being slight, at other times profuse. The bone had been curetted and the wound carefully treated with no permanent relief. When I saw him first the local symptoms were not especially marked. The mucous membrane was thickened on the alveolar ridge, and a sinus was discharging a small amount of pus. His mental condition, however, was so alarming that his physician felt the absolute necessity of clearing up the case, finding out if possible the cause (which not been determined) and treating the case accordingly. The

patient was deeply depressed, and suicidal in his melancholia, so that he had to be watched. We had a radiograph taken, a procedure which had not previously been resorted to for some reason. This showed an imbedded third molar lying horizontally well down in the bone. There were no teeth except this one, posterior to the cuspid. General anaesthesia was contra-indicated owing to his physical condition. Under cocaine, the tissues covering the tooth were removed, but I found the membranes of the tooth and the socket so calcified that it was impossible to loosen the tooth from its bed. With the engine and surgical burr the tooth was burred away gradually, it being possible to work but a few minutes each visit. The bone in the vicinity was also burred away, for that was where the pus seemed to be coming from. Toward the last, the drilling was so near the inferior dental nerve that it caused great pain. On this account we were obliged to stop. The patient during this time improved gradually, and the mental symptoms entirely cleared up. The wound, which never absolutely healed, was kept dressed and he was entirely comfortable. A year and a half after I first saw him he was again seized while spending some time at a southern resort with another swelling on the same side. This was treated with electricity for fifteen days. His vitality was not sufficient to bear this onslaught of infection and this method of treatment and the patient died. In this case when the cause had been found and the treatment directed toward the cause, the patient apparently ceased to worry about himself and the mental condition gradually cleared up. It was interesting to watch the patient's return to a normal state of mind. When he first came, the extreme mental depression was very evident. By the time it became necessary for me to see him only at rare intervals he was happy and cheerful even to the extent of telling a good story. Another type of imbedded tooth is represented in Case 6.

Case 6.—Young Hebrew girl, 20 years. Had acute alveolar abscess on lower right side. Second molar was extracted with a decrease in severity of symptoms. Swelling below the bone in sub-maxillary region persisted, and she came to the surgical outpatient clinic at Massachusetts General Hospital. Fluctuation could be felt in this swelling, and an incision was made and pus was found. Still the case did not improve greatly and the wound

still discharged pus. She was sent to me for consultation. An X-ray was taken and an imbedded third molar tooth was found horizontally placed in the jaw. This was removed and the case soon began to improve, and gradually the pus decreased in quantity and the wounds healed up.

These cases I have been discussing were all cases of simple imbedded teeth. In addition to this type of case, we get imbedded teeth which are at the same time impacted. This leads me to a subject which I feel is becoming one of serious moment to the dental profession. It is without doubt a fact that impacted teeth are becoming more and more common, particularly impacted third molars. Possibly one of the causes of this is that the six year molars have not been so frequently extracted the last few years as they were before, with the result that more frequently there is insufficient room for the third molars when it becomes time for them to erupt. With an increase in our knowledge of the development of jaws and teeth and with the aid of orthodontia much will be done to prevent this condition occurring, but nevertheless I repeat, this matter is already a serious one. Much depends on the skillful handling of these cases, and I deplore the ill advised attempts at extraction either under cocaine or nitrous oxide or Somnoform, the results of which I so frequently see. The nervous shock and the severe pain due to roots which are not removed or to the excessive injury, are complications of serious importance. One gentleman told me recently that he had an impacted third molar removed under cocaine, which took a half hour to do, but took him two years to recover from the nervous shock incident to the operation. The one on the other side was removed under ether and he recovered from the nervous shock of the operation in three days. I do not believe in unduly alarming any patient by bluntly impressing him with the idea that an operation is going to be one of somewhat serious nature, neither do I think it fair and square either to the patient, to the man to whom the case may be referred, or to the dentist himself, for the dentist to say when it becomes necessary to remove an impacted third molar that it is a very simple matter; only a work of a couple of minutes. That happened only recently in my practice, and when it turned out that it took over a half hour under ether to remove the tooth, with subsequent dressings also necessary the patient must have

felt that either the dentist who referred her to me with that story was deliberately telling an untruth or that he did not appreciate fully the character of the case, or that she had fallen into the hands of a most unskillful person.

But to return to a general discussion of impacted teeth, just let me say that frequently a tooth is prevented from erupting, even partially, because it is impacted, so then we have the two conditions associated. From the impacted tooth that is also imbedded, we may have various stages of partial eruption, and, of course, there are various degrees of impactures also. The etiology and pathology are not unlike that of imbedded teeth, and I will not take the time to discuss them. The *symptoms* are very varied, although pain is very common in these cases.

Case 7.—Woman, 40 years of age. In perfectly good health. She fell through an unfinished flooring, a distance of eight feet, and struck on right shoulder and head. Soon after that she commenced to have pain along the face and cheek, running up into the temporal region. Then her face commenced to swell and she had an abscess over the first and second upper molars. Her dentist found the pulp of both of these teeth dead. The first did not respond to treatment and was extracted, while the second molar was treated and filled. There was no real relief, however, from the pain, which became increasingly severe. The tissues of the mouth and the teeth themselves seemed perfectly normal. She was referred to me for consultation, but did not come, for about this time she moved to another town. The matter drifted for six months, meanwhile the pain becoming more severe and more frequent. She was finally persuaded to consult a well known neurologist, who examined her carefully and found nothing to account for the pain she was having. By a strange co-incidence this physician also referred to patient to me, and this time she came. Examination of the mouth revealed nothing at all suggestive. A radiograph was taken and this showed an imbedded third molar on the upper right side which was impacted against the roots of the second molar. This was removed carefully and gradually her pain became less severe and came at rarer intervals. She finally recovered entirely and has remained free from pain for more than a year. The tooth was so far buried in the bone

that there was no surface indications to lead one to think a third molar was present.

Case 8.—Woman, 32 years. She complained of indefinite symptoms on upper right side. No pain, but a sense of pressure was quite troublesome. She wanted to grind her teeth together and felt better when she did so. Noticed last few months cuspid and first bicuspid seemed to be moving outside of the other teeth. None of teeth sore, and face had swollen at no time. X-ray showed an imbedded impacted third molar.

Case 9.—Man, about 25 years of age. He had been suffering pain on left side of face in temporal region. The aurist found a purulent otitis media. Paracentesis was performed. The improvement was temporary and an operation on the mastoid became necessary two weeks later, the pain during this time being quite severe. After the mastoid operation the pain still was intense. This pain was located about at the angle of the lower jaw running towards the ear, and also along the jaw itself. His dentist was called and he advised the removal of an impacted lower third molar on the same side. I did this under ether anaesthesia. There was considerable stiffness in the joint following the operation, but the pain was fairly comfortable for a week, the wound being kept packed during this time. About a week later the pain started in again worse than ever, and tremendous doses of morphia were necessary to control the pain, and to make his condition at all bearable. Radiographs were taken of the head from various angles. One of the pictures revealed a superior third molar imbedded and impacted on the same side that he had been having all his trouble. In consultation it seemed wise to remove this tooth, but the patient refused. It happened that the night following his worst attack of pain he was quite comfortable, and has not been having much pain, which is nearly two weeks. What influence came in to stop this awful pain he had been having is not clear.

The third group of cases, of which I will present but two, illustrate a condition, the symptoms of which are not unlike those of either impacted or imbedded teeth. I refer to imbedded roots.

Case 1.—Man, 45 years of age. Had suffered pain for some months in the cheek and infra-orbital region. This pain, which was constant, but at times became darting and ran up into the temporal and frontal region. His face would swell at times and

he noticed a swelling in the mouth in the vicinity of superior left bicuspid region. Pus discharged in small quantities.* Radiograph was taken and the tip of a bicuspid root was seen imbedded in the bone. This was removed, the bone curetted and the pain was not long in disappearing.

Case 2.—Woman, 35 years. I saw her first March 10, 1910. Two and a half years previous she had had a superior left first molar extracted. One year later, she commenced to have a bad taste in her mouth occasionally. In the morning she felt tired and sometimes nauseated. Later she had occasional attacks of vomiting. She treated with a physician for this condition and it cleared up temporarily. Six months later she again had the same sort of symptoms, and she noticed a discharge in her mouth and complained of pain over left side of face. She consulted her dentist, who found a sinus from which pus was coming. He referred the case to me for treatment. The radiograph which I took showed a large abscess in the superior maxilla, and a large piece of root which had evidently been broken off in extracting. In the operation which was done, the root was removed, the abscess sac curetted out and the second molar extracted, for this tooth had become involved. The cavity was packed and made to fill in from the bottom. This last year since the operation she had no attacks of nausea and vomiting and the other gastro-intestinal symptoms have disappeared. She was apparently getting a gastro-intestinal intoxication from the septic products of the abscess.

In conclusion, I wish to make the following points:

First—Imbedded teeth are far more common than is generally believed.

Second—It naturally follows that cases of this sort are frequently overlooked, especially in the search for causes of neuralgia of the head.

Third—The symptoms produced by imbedded teeth are so varied that cases where the cause of a disturbance that could in any way be associated with the teeth is not determined, radiographs should be taken.

Fourth—Careful records of these cases should be kept, and cases of unusual interest reported.

Fifth—Impacted teeth as well as imbedded teeth frequently are extremely difficult to remove, and care should be taken that

the operation is done in such a way that the nervous shock shall be minimized as much as possible. Furthermore, it should be done under an anaesthetic that will allow ample time to do the work properly and enable the operator to get the roots all out.

Sixth—While I did not touch at all on the after care of these cases of imbedded and impacted teeth and imbedded roots, nevertheless it is extremely important, and lack of time alone prevented me speaking of it. That phase of the subject is reserved for another paper.

THE CARE OF THE TEETH OF THE SCHOOL CHILDREN OF BOSTON, WITH SPECIAL CONSIDERATION GIVEN TO THE METHODS PROPOSED BY THE FORSYTH DENTAL FOUNDATION.*

BY WILLAM P. COOKE, D. M. D., BOSTON, MASS.

Before beginning my paper in order that we may all approach this subject with an open mind I wish to refer to a misunderstanding that is general in the minds of the profession regarding the Forsyth Dental Infirmary.

The control of the professional policy of this infirmary has been wholly in the hands of the Tufts College authorities, on this account it is generally believed and openly stated by some that this Infirmary is simply an annex to Tufts Dental School; that it is planned to furnish an infirmary and ultimately permanent quarters for this school. I have talked with Mr. Thomas Forsyth, our guest, and I asked him if it was his plan to endow, aid or furnish, an infirmary for Tufts Dental School. He said, "No; this is an entirely independent institution."

If you will bear this in mind I think you will receive the suggestions I have to make in an impartial manner. What I have to say concerns the professional policy of the Forsyth Infirmary rather than the authorities who have control of the professional policy.

I need not spend any time in describing the conditions in these mouths or their need of dental care. We all know they are very bad, and the question is: "What are we going to do with the problem?"

First Attempt.

The first attempt in caring for the school children's teeth was made in Strassburg, 1885, by Dr. Jessen. In 1894 the "International Dental Congress" passed the following resolution: "Decay of the teeth has become an epidemic with all peoples, and remedies against it, especially with the children, have become urgently necessary." In Germany the first public clinic was started 1905. In Rochester, N. Y., the first in our country was opened February 22nd, 1905. Three clinics are held in schoolhouses in connection with their Public Health Association.

*Read before the American Academy of Dental Science, Boston, April 5th, 1911.

Enrolment.

The enrolment of school children in Boston on June 30th, 1910, between the years of five and fifteen, was 83,000, under five years 3,000, 86,000 in all. The dental needs of the children come under three classes:

1. Those needing relief from pain caused by exposed pulps or other inflammatory conditions.

2. Those needing relief from diseased conditions in teeth and surrounding tissues.

3. Those needing reparative measures caused by decay of the teeth.

The loss to the public in money alone caused by these conditions is very great. The suffering endured by these afflicted is beyond description; weak, poorly nourished, they drag out a miserable existence when by a changed oral condition a life of joy and peace might be theirs. The problem is a difficult one to solve. The younger the child the more important the work becomes.

The work of helping these children can be done in three ways: 1st, Surgical treatment; 2nd, mechanical treatment; 3rd, preventive treatment.

Surgical Treatment.

This treatment is applied in the extraction of badly decayed and abscessed teeth, the removal of tonsils and adenoids, and other surgical treatment needed in the mouth, should be available at all times during the child's life, a large proportion of children in our public schools would enjoy better health if the diseased conditions of the mouth were remedied by the removal of the diseased teeth. For many this is all that can be done. These people only come for this treatment as a relief from pain. While extraction will relieve this pain it will not produce a clean mouth unless it is applied to diseased teeth that do not ache. This valuable asset in the crusade against disease will not be voluntarily sought unless the children and parents are taught that the removal of the diseased teeth is necessary for the child's health, even if the teeth are not causing pain or even discomfort.

The relief of defective condition should be compulsory. This will be brought about by co-operation with Boards of Health and school authorities making a clean mouth a requirement for school attendance.

In order to secure the co-operation of the parents and children in the extraction of teeth it is necessary that the clinics rendering

this service shall be located conveniently near to these people. The more extended surgical work can be carried on in a central plant. Dr. Evans, Commissioner of Health in Chicago, says: "The dental clinics should be in centrally located schools, so that the children can reach them by short walks."

Mechanical Treatment.

This includes the filling of decayed teeth, the treating and filling pulpless teeth, the straightening of teeth, porcelain inlays, crowns, and bridges.

The call for this kind of work is so great that it is beyond the power of the dental profession to remedy these conditions.

You might as well try to press back the tide of the ocean with a broom as to attack the problem from this standpoint.

The thousands of cavities caused by lack of care and improper food would, if all filled and conditions remained the same, be followed by another crop of cavities as bad as the first, in six months to a year. This method is being tried with poor results in some cities and a dentist who in a public school clinic in a nearby city went into this method of treating these cases with other dentists with enthusiasm, said, "We were soon overwhelmed and could produce no more effect upon the problem than the effect produced on a pail of water by dipping your finger in it." One writer says, "The applied skill of modern ingenuity is but an inadequate remedy for the consequences resulting from the neglect of the teeth in childhood."

Every dentist who has been in practice for five or more years knows that the hope of making any lasting impression upon the mass of decay found in children's mouths, during these ten years of proposed supervision, is a vain hope. In private practice we cannot cope with the problem unless we secure a changed condition from the one under which the decay occurred. This change of condition is one made by the patient and shown by the better care of his teeth. Clinics founded to attack the problem by the means of general mechanical treatment will fail to give the school children what they need, as every dental school clinic and other private clinics have failed in this respect.

Preventive Treatment.

The application of preventive treatment calls for a large amount of money and a service that shall be continuous through time. The work should be begun in the kindergarten grades and unless begun here and made a success here, failure all along the

line will result. This treatment begins with dental inspection.

This alone will do much to improve the condition of the mouths of the children as it calls the attention of the parents to the condition of the teeth and the necessity of caring for them. This inspection should be made by a dentist or by a trained dental nurse. The average medical inspector is not qualified for this work.

The preventive treatment must consist of instruction to parents and children, to school masters and teachers.

Co-operation with the Board of Health and School Committee, social settlement workers, the public press, the distribution of properly prepared literature.

Conferences with teachers and parents with clinical demonstration by means of dental hygiene exhibits.

Home visitation by dental nurses under instruction and pay of the dental authorities.

Unexpected examinations of the teeth of the children at the schools. Clinical instruction of the children in cleaning their teeth.

The providing of tooth brushes and powder at a very small price for needy people, so that when the family is visited by the dental nurse and she asks if they are brushing their teeth, the family tooth brush will not be the only one produced as evidence.

The combatting of the candy habit in children. These, and many other things need to be done for the school children of Boston. Under the head of preventive treatment, problems will constantly arise that only a regular endowment fund can solve.

Specialized Treatment.

Every child should have a chance in combatting the disease of his mouth by having the original defects in his tooth structure filled.

In spite of care teeth will decay unless these original defects or fissure cavities are filled very early after the teeth erupt. This need of the child calls for specialized treatment.

This class of mechanical treatment offers the only point of attack that is full of promise. In order to make this treatment successful it must be given systematically. Take the care of one child as illustrating all the children: The child comes to the time for the first permanent or six-year molar to erupt.

He has received instruction and has had his mouth kept in fair condition, any original defects in the temporary teeth have been filled, any cavities from neglect have been treated with silver

nitrate and all diseased teeth have been removed. With the loss of very little tooth tissue and with a good chewing apparatus his six-year molars have erupted and are in normal position. He is examined within a few months and found to have original defects in the fissures of all these molars. The most important period of this child's tooth development has arrived.

This is the golden opportunity for the dentist.

These cavities filled now will prevent future trouble. Let them be filled. The lateral incisors and bicuspid and second molars as they erupt are given the same treatment. You have done for this child the greatest dental service possible. The sixth year molars are the most important teeth in the mouth. The orthodontist knows this and has brought it to our attention.

They are the largest and best teeth and serve the child during the later period in which the temporary are being shed as his main support in chewing and keeping his features in proper shape.

Their loss is a dental calamity.

In this filling of the original defects you have given the child a chance. Without this treatment no amount of cleaning will prevent the loss of these teeth. They are lost oftener from decay of these fissures than from the decay of neglect.

A child thus treated can, if he keeps his teeth clean, save his teeth and prevent after troubles. If the child will not keep his mouth clean, his teeth are doomed whether he lives in the Back Bay or the North End.

Now what has been done for this child can be done for a school full of children and for many schools.

Concentrate, for five or ten years, your efforts in mechanical treatment to the saving of these teeth as they erupt by filling the original defects. Form a sixth year molar crusade.

You can eliminate more dental troubles than by any other one method.

This work can be done by the men that run the extracting clinic in close proximity to the schools.

Follow these children up, examine their mouths three times each year, and you will have started the child in the battle of life with a good dental outfit. No amount of work done five years later will take the place of this early treatment.

The saving of the sixth year molar is the key to dental efficiency. The regular practitioner knows it by sad experience.

This is the point of attack. The mechanical treatment can succeed here if applied early.

Specialized Treatment for Families.

The family is the centre of any community life. The selecting of 100 or 200 families with several children in each, located in different parts of the city, who cannot from lack of income provide dental care for themselves, and caring for their mouths for a period of five years would furnish many data for future guidance besides keeping in each community an object lesson of the desirability of clean mouths.

First examine each person carefully, including father and mother, take accurate records as to the physical condition.

Put their mouths in perfect condition and examine them three times a year and keep records of the results, filling, treating, and extracting, as needed. The results at the end of five years would be a valuable asset for dental hygiene and would extend the work of dental hygiene.

This work has never been done, can never be done by any dental college or agency in existence. It is sadly needed.

Neglected Cases.

What, then, shall be done for the teeth of the children who have been neglected and who are the usual patients at dental clinics?

You must begin with the young children and put your effort upon them, if any real and lasting dental improvement is to be accomplished.

The children who have been neglected should be given surgical treatment so their mouths can be fairly healthy though all cavities of decay are not filled. The ordinary dental clinic by attacking the problem too late is a vain though heroic attempt to stem an irresistible tide.

A man should not plant any more land that he can properly cultivate. Many dental clinics waste energy by trying to care for hopeless cases.

This energy put into a continuous effort on the specialized lines above mentioned will accomplish much. Begin this specialized treatment and if you have money left you can spend it in caring for neglected cases.

Dental Nurses.

Reference has been made to the dental nurse.

Legally she does not exist, but the conduct of the work of caring for the children's teeth calls for her existence.

She must come and come soon. She is needed to clean and

examine the children's teeth, to give instructions in their care and to visit and interest the mothers and fathers in the work.

The man who can fill teeth should not spend his time in cleaning teeth. The crusade against the defective sixth year molar will keep him busy.

Who is to determine who is worthy of receiving free treatment?

The dental nurse by visiting the families can settle this question.

These people do not want attention given to their teeth. They have a prejudice against hospitals. The work of a dental nurse in calling on these people in their homes will do more to bring them into sympathy with this movement of prophylactic and dental hygiene than any other means.

The dental nurse is an established agent abroad. We are behind hand in not using her.

Summary of the Problem and Ways of Attacking It.

We have, then, the problem of caring for the teeth of 86,000 children. This can be done in three ways: 1st, Surgical; 2nd, Mechanical; 3rd, Preventive. I have stated that the surgical is called for all the time by diseased conditions.

I have stated that the Mechanical can only be successfully applied if used in special cases, as illustrated by the treatment of the sixth year molar shortly after eruption, and the treatment of families where there are children.

I have stated that the Preventive treatment is the most important and that under its head a great variety of agencies can be used to meet constantly changing conditions.

In the light of these facts let us consider the latest aid in solving these problems, The Forsyth Dental Foundation.

"Opportunity is like a turnstile through which one must step quickly." It is only comparatively recently that the relation of dentistry to the general health of the individual and to the community has been recognized even by its friends.

With the recognition of this relation came the opportunity for helping these unhealthy conditions in a broad way. This opportunity, to the honor of the Forsyth family, was embraced by Mr. John and Thomas Forsyth; it is to the lasting credit of these men that they have devoted so large a sum to this object.

The causes that led to this gift show the close relation and fine feeling existing between them and their deceased brothers in whose memory the fund is established.

Given in memory of James Bennett Forsyth and George Henry Forsyth. No written legal document bound these men to devote this money to this purpose, but bound by a stronger tie, one of pride in an ancestry that prides itself in honest dealing and in doing good to others and in the tie of love and affection that has bound these brothers together for half a century, they fulfilled the expressed wish of Mr. James Bennett Forsyth and have devoted the funds that were legally theirs to the Forsyth Dental Foundation.

They have led the world in gifts for this object and have helped the public and given a prominence to our profession not even dreamed of a few years ago, and we thank them. The trustees of this fund have submitted to the profession tentative plans illustrating one way of handling this novel project, and have asked our opinion concerning them.

Children.

The project is dedicated to the children. This being the keynote, it warms our hearts instantly.

Prophylaxis.

The prophylaxis; the preventive treatment above referred to.

The proposed method as outlined in the booklet loses sight of the prophylactic treatment in the other means introduced to solve the problem.

The location of the plant and concentration of equipment in one location will not permit this foundation to accomplish much of the work it is founded to do.

Take as an illustration the method proposed in the tentative plans of bringing a number of children under nurses' care to the Forsyth Infirmary. This nurse must meet, say, twenty children in the North End. She would probably meet them at the schoolhouse they attend. The fares to and from the Infirmary would be \$2.10. She would wait for them and take them home; a half day would have been used up. Suppose that these same children were to go to a clinic in the school building or near it. They would go on foot unattended as they know the way. This same nurse dentally trained would meet them in the clinic and could in the time she would spend in going to the Infirmary in the Fenway, clean and polish all the children's teeth and the \$2.10 would nearly pay her wages.

The experience of all social and settlement workers is that the closer you can bring your plant to the people you wish to help the better your result. This applies to medical, religious, educational and industrial work. The endeavor to place in one build-

ing all the branches needed, detracts from the memorial character of the building and does not accomplish the work the fund is given for.

If the trustees will place on the Fenway lot a building in the development of which the real needs of the children are considered *first*, they will secure a more fitting memorial and a more useful building.

This building can be used as the central plant and contain provision for administrative offices, and a modern surgical suite fitted for all surgery of the mouth, not only with the improved methods of anaesthesia as applied to dentistry, but for the proper treatment of tonsils and adenoids, a surgical suite of this kind is crowded out by other things in the present plan. Rooms for the instruction and training of dental nurses are needed.

Provide for fifteen or twenty chairs for mechanical treatment of decay and for prophylactic treatment.

Use this building as the centre of administration and place in the North End, the West End, South Boston, and other centres as many clinics as they can maintain in close proximity to the schoolhouse, or in it.

Location of Clinic.

If the clinic is near the school, or in it, the child needing attention can receive it without loss of time from his school, as he can be spared for an hour at a time. These patients do better without long appointments. Co-operation with school authorities will be more easily secured.

By this plan the Forsyth Foundation will be a real power in helping these people. The use of already established means of instruction and visitation will do more than the starting of a new and separate movement.

Each week the Milk and Baby Hygiene Association, The District Nursing Association, The Mothers' and Fathers' Association have meetings with the nurses and physicians present; co-operation with these Associations is desirable.

It will save the time of the mothers and fathers and will place the care of the teeth and mouth upon an equal footing with the care of the rest of the body.

Research.

The establishment of a research department in connection with this foundation is a duplication of plants. The Tufts Medical School, the Harvard Medical School, the Harvard Dental

School, have well-equipped plants for research, also the City Hospital and the Massachusetts General Hospital.

They welcome members of the dental profession who are qualified to do research work. The children will not profit by this duplication of service as the same amount of money spent in helping already equipped plants would bring better results.

The properly equipped research department calls for a chemical laboratory, a physiological laboratory, a pathological laboratory, a bacteriological laboratory. These use animals for experiment. The keeping of them in connection with a memorial infirmary building is not wise.

The chemical laboratory is always a nuisance with its odors, and would be better placed elsewhere.

If the trustees wish to maintain research work it can be done by devoting a yearly sum to support a *Forsyth Researcher* in connection with already equipped research laboratories. The space devoted to this department in the building is needed for other purposes.

Research work is really an annex to, rather than an essential part of the work the Forsyth Foundation stands for.

Free Treatment.

That many patients must be treated free we know, but the advertising that the work is free, even when the patient can pay a small fee, is in direct opposition to the experience and advice of hospital and social workers, any fees collected go to enlarge the work.

Dr. Evans, Health Inspector of Chicago, says: "Make every person able to pay, do so for his dental work." "See that no person needing dental work and unable to pay goes without it."

The maintaining of independence and self-respect require that children be taught to pay for what they receive. I am sure that the Forsyth Foundation does not mean to encourage dependency in children.

Volunteer Service.

This service is not to be relied on for a continuous service.

It will be irregular in attendance. It is difficult to keep this class of service in harmony with the established system of organized work; you might as well expect to provide teachers for the public schools by this method.

Volunteer service lacks the essential of team work needed.

It would take 300 men, giving one day a month, to keep 10 chairs filled, provided they came regularly.

You need not allot much space in the building for this service. It will prove unsatisfactory.

The children need to have the work begun by an operator completed by the same operator. The work, done by a volunteer service, finds its counterpart in the story of the work done on the Tower of Babel.

Teaching Staff.

The introduction of the teaching element into the Forsyth Foundation is a source of weakness. It is trying to meet a new problem with an old method and a method that has failed to give the results that the Foundation seeks.

The function of teaching dentistry belongs to the dental schools.

The student of dentistry cannot, while attending a properly equipped school, spare any time in which to render service at the Forsyth Infirmary.

The appointment of teachers to instruct students implies conditions similar to any regular dental school. The setting apart of rooms and toilet for students, visiting dentists, the building of an amphitheatre where students can witness operations is in the same line. Now, in all clinical teaching, a patient is necessary for demonstration and for practice for the student. This necessity in dental schools should not be used in the work the Forsyth Foundation has undertaken. Why should the children of our public schools be exploited for purposes of demonstration? It is not necessary to secure their comfort and will only delay the work. These children should have as careful treatment as if they were in our private offices.

Ten good graduate operators who are under an appointment on a good salary, who render daily service, conducted as we conduct it in our offices with intelligent assistance from dental nurses, will accomplish more in one day than a hundred students. The student body do not belong in this movement and should not be allowed in it.

Post-Graduate Courses.

This work comes under the same class as teaching the student.

An operator cannot teach and work. All the time given to teaching will be taken away from work. This implies that the

work of the Foundation is to teach the profession, that function belongs to dental schools. This Foundation is to serve the needs of the children.

The children will not be benefited by the post-graduate scheme.

Summary.

The proposed method stands for the mechanical treatment of decay.

Copied from the dental school idea, but possessing none of its excellences or reason for existing, it proposes to solve the problem of saving the teeth of school children by an old method that has failed.

The plan does not get away from the element of teaching. The proper development of the surgical department is prevented by the introduction of the teaching element.

The elimination of students as operators and spectators is essential.

The elimination of graduate spectators so that the patient may receive the same treatment as he would in a private hospital is desirable. The patient should not be used for exhibition purposes.

The elimination of the research department and the museum is desirable. The elimination of post-graduate courses or any instruction to graduates is desirable. Devote less space to a lecture hall and instruct the mothers in their homes.

The furnishing of service to patients to the foundation by graduate salaried men under the direction of a graduate salaried manager is needed.

Only graduate men should render service in this work. This is a work for men who are in earnest. The plant is not made for drones, but for workers. It should be managed as a business. Only salaried persons or those who will give their whole time as assistants similar to an interne in a hospital should render service. Team work following certain defined lines will accomplish wonders.

The establishment of clinics managed by salaried men in the region of the school centres is needed. The development of a trained staff of dental nurses and the employment of the same in all branches of the work is needed.

The placing of this foundation in so broad a field that it will lead in dental matters through time, is a consummation devoutly to be wished.

The development of the prophylactic treatment where the people can receive it is needed.

Leave Orthodontia to the specialist and the dental schools

Spend the time and space devoted to porcelain work in saving hundreds of teeth for every one saved by the porcelain filling.

The dental school conception has been the dominant idea in the method of the Forsyth Foundation. In this idea the student, the profession, and instructors, are the primal objects considered.

The patient is the secondary object. In a private office or private hospital the patient is the primal object; the arrangement of the plant is made for the patient. The patient comes in at the front door, he is made comfortable in a fine reception room, the best the office affords is at his disposal. The operating rooms possess all the essentials as to light, location and privacy. Attending nurses and assistants minister to his wants. The observer is kept out. The play to the galleries is eliminated. You can readily see how an infirmary planned with the patient as the primal object will differ radically from the present tentative plans submitted. The patient was the thought in the mind of the originator of the Forsyth Dental Foundation. When Mr. James Bennett Forsyth, during his last illness, when discussing with a friend the bad condition found in the mouths of the children, asked why they did not begin treatment before the teeth reached that condition, he had in mind an institution in which the child was the primal object. I plead for the children.

That the present plan may be modified.

1st. To provide surgical, mechanical, preventive treatment in the school centres.

2nd. To limit the mechanical treatment to specialized work.

3rd. To utilize to the fullest extent the employment of visiting and operating female dental nurses.

4th. To eliminate the teaching element and use only paid graduate men and graduate internes.

5th. To replan the building in harmony with the private office idea, the patient being the primal object, making it a more useful building and a fitting memorial to James Bennett Forsyth and George Henry Forsyth.

Enlargement of the Foundation's Scope.

The dental profession is being called upon for public clinic work as never before. The methods in use now by these clinics will soon be modified. Enthusiasm will wane, the desire for pub-

lic notice and advertising will soon fail of its purpose, men will leave the work. The needs of the public and the school children will remain.

We need a foundation to guide and control in these matters.

The great influence of such bodies as The Rockefeller Foundation, The Sage Foundation, The Carnegie Foundation, The Ginn Peace Foundation, can be duplicated in the influence upon dentistry by the Forsyth Foundation. The gift by these brothers with pure motive should not be allowed to fail of its object through a misconception of the way in which the work should be done. The dental profession should be a unit in backing this foundation. The profession cannot be a unit in supporting this present plan as it is fundamentally opposed to the experience of the dental practitioner.

The Trustees of the Foundation hold the most prominent place of influence upon the dental future that has ever been held by any body of men. The influence of their action upon the public and the profession is not easily overestimated. If by their action they give us what we have hoped and longed for they will do well. If, however, their present method is carried out, the profession will still wait for its leader. The needs of the school children will remain practically as they were before this foundation was established.

APROPOS "TOOTH TINKERS."*

BY DR. WILFRED R. WILSON, BOSTON.

Mr. President and members of the Massachusetts State Dental Society.

GENTLEMEN—When the president of your society extended to me the invitation to be present at this convention he indicated that a few remarks might be required from me. I shall, though, however, confine myself to the subject matter rather than tire your indulgence with any digression therefrom.

Apropos of the subject I propose discussing and illustrative of my subject remarks on same, the following story may with entire propriety be repeated by me now. I heard it while in London. I trust that in its new environment it will lose nothing in the telling—either in effectiveness or interest. There was a Scotchman, a stranger to the ways of city custom, fresh from the land o' Heilan heather, making his first search in aid of an aching molar. He called upon a physician and was advised to consult a dentist. He called upon the dentist and was advised to have the extraction of the troubling tooth, and forthwith the dentist stepped away to get ready the gas apparaus with the required instruments. While the dentist was doing this the Scot stood away in the furthest corner of the room, and was observed gathering from his pockets his money and counting it very carefully over. The dentist, seeing this, said rather testily:

"My man, don't you know that in a place of this kind it is not necessary that you should count your money?"

"Weel," said the Scot, "aboot that I am nae sairtin, but as ye are aboot to mak' me unconscious I just thought I'd see aboot hoo I stan'."

This Scot's sagacity should have stood him well in some of the situations I shall have occasion to remark upon a little later, devoting, as I shall, my endeavors to tell you something of the practical phsycology, the kind that pervades advertising dental offices, inundates operators employed there every day of the year, and of which the "Contractor" is the fecund source, without a

*Read before the Massachusetts Dental Society, May 11, 1911.

definite understanding of which, no kind, of any sort of tooth tinkers, could do business and last into the second month.

I suppose I have more times than I can recount been asked the question, "Doctor, how do they do it?" With what modicum of penetration that has come to me it would seem rather a perplexing one for analysis.

The mysteries, and occultism, the inter-playing and scheming, the facile misrepresentations of the hypnotic "contractor" in fatiguing to his designs the purse strings of the credulous, creates something very akin to a sleight of hand laboratory under a new name—aided by the physical appearance of stability that pretentious furnishings and generous equipment, with neatly courteous lady attendants might suggest to the one accustomed to judge by observation, the illusion still further enhances itself by the ingratiating if not obsequious devotion in the "contractor" in behalf of the work which he says is so urgently needed. Much of this is skepticism dispeller tabloids.

It may be that some attempt to give you a word picture of the sort of person as to type, the "contractor," as he is more familiarly known, is, in action, with a "prospect" closeted within sound-proof walls, amid tasty surroundings, may be of interest. For the purposes of the description there is a small office room, equipped with attractive dental furniture and a small writing desk. The walls on three sides display copies of "patents" supposedly granted the inventor whose name is at the head of the concern—and which, by the way, is conducted under an alias, by several countries abroad, after years of untiring research and ceaseless energy you are told, as they are being pointed out to your notice. You also, incidentally, are informed of the big suits already in the courts defending the validity rights against infringement by dentists with no right to use them. If one were of a studious bent of mind or interested in the solving of puzzle wonders, there would be a like work for that person to tell wherein lay the relation of any single operation performed in connection with dentistry in that office and that described in the framed wall pieces that are supposed to cover and constitute them unique.

Of course, the whole proposition was nothing new that was not old to informed practitioners, except, the advertising cam-

paign that was carried on in the three prominent Sunday newspapers. That was new. The expense of such advertising makes imperative a commanding income from some source. Such an office will pay the highest salary for rapid and skilful operators. Not only has an operator to be rapid in the execution, he must be sure of the ground he covers in his work, and to keep up his "gait" with material that the laboratory may be kept employed. Should an operator be the highest salaried one on the staff he is most likely to be the buffer, the one inter-played with on the other end of the line with the "contractor" in the "contracting room."

To be a "contractor" in an advertising dental office it is not important, with the management, that he be a dentist. One of the most notorious offenders in this class had in days gone by sold "gold bricks" for a livelihood, and in the estimation of the office employing him was a valuable man.

The "contracting room," in the parlance of the "parlours," is the retiring room, the den, of the "contractor," the one place to which all alike must repair when, having read the big advertisements of "wonder working processes and methods" they are attracted to making a personal visit. Lacking better facilities for the personal interview, because of too great intervening distances, they are invited, by the advertisement, to "write for our booklet, giving full information about our wonderful method." Any one who has not written for one of these cunning descriptive works should do so, and see how much you are helped and enlightened. Your dental education will not suffer alarmingly, but for a two cent stamp you will receive in return a neat brochure costing several times more than the price of the stamp you sent. Also, in addition you may expect a definite system of follow-up letters, choking your mail box for weeks, inviting a personal visit to the office, "where it will be a very great pleasure indeed to welcome inspection of their facilities and explain the method more fully in detail." Only when desired, of course, an examination of the special needs of your case will be cheerfully given, and no one need consider himself under any obligation to have any work done." As a natural sequence the logical result is that no one ever gets away without being first examined. A certain kind of advertising attracts the people into the office. And the

desirable sort of "contractor" sells whatever it is the people think it is they want, and gets the money. It is the experience of the writer that the easiest and the smoothest path the advertising get-the-money dental concerns have before them is the one worn and surfaced by the investors themselves in their unscrupulous services.

The "examining specialist" is the dental advertiser's "barker." Whether you will feel satisfied with the price paid will largely depend on the ability of the operator when you go into the chair. The conditions that obtain in the offices of this kind wear most of all upon the operators, and he is the wise man who removes without the circle of their unwholesomeness early in the day. Advertising dental offices stand or fall in direct ratio with the ability of the "contractor" to get the money. His power is in steady defiance of whatever office conscience may ever leak in. Revolving about this functionary keep the activities he inspires. Raised contracts, commission opportunities are diverted or given to an operator as the "contractor" may see or feel disposed.

I have made some reference to a system of follow-up letters, part of the organization of such an office upon a business basis. These are letters dispatched to recent patients asking after the satisfactoriness of the work and inviting a visit that the same may be examined, if possible, but, if circumstances should constrain against the call being made in person, would they be pleased to write commending it. Assurances go along, of course, of no intention to publish her letter, that the spirit and motive is wholly prompted by the inner satisfaction it would give the office to know how the unusual difficulties encountered in treating her case had been successfully met and that Doctor ———, mentioning some operator, desired with them to inquire concerning the success of the work done. Usually if the first part of these letters seems not to bring the desired response, the second portion of it will, and most times a pleasing reply to the office will be had. Once in a while these replies would come to the operator in his mail, and for the first time he then would be acquainted what were the processes actuating the brain of the

"contractor" observed at different times in dictation to the stenographer.

Letters when received in this way would be neatly pasted in a book kept for the purpose, and placed upon the reception room table, where they can be seen, and appreciated, by the skeptical investigator, who has read the big ads.

Desirably these letters are sent out to former patients whose charts indicate opportunity for more work in the mouth. Such opportunities are accelerated by a succession of follow-up letters—one or two a week, first inviting the patient to call at the office for examination of what was previously done, but is really with the view to consummating a second "contract." Should the patient appear to be an unresponsive one, prices will begin to appear as an inducement, if possible.

In this regard I have known cases to cost one hundred dollars for the upper, the patient not wishing to afford a similar outlay on the lower jaw would be quoted the same price for that work. Such data would appear, as well as point of conversation, charted in the remarks portion on the patient's card, and from these suitably worded follow-up letters would be dictated.

As I have already suggested, if no reply came from the first two letters, the matter of expense would now be mentioned, and "how out of consideration for the facts of her being an old patient, that any other line of work would surely be unsatisfactory in opposition to the 'method' if done elsewhere, the office would be pleased to complete the lower work for seventy-five dollars." Allowing a lapse of a week or ten days, another form letter finds impetus and circulation cautioning the patient of the desirability that she not go elsewhere for dental services, which, in such an event, of course, the office would consider its position as relieved of any future responsibility with relation to its "guarantee."

Another form letter would be likely to offer some such good will as this: "Desiring your future co-operation and goodwill and out of consideration for the many favors in the past, we will complete the necessary lower work for fifty dollars, and a letter with permission to publish the same, or use as reference."

Many of the testimonial letters that possibly may have been observed in the newspaper advertisements of these offices were

secured in this way. Some letters written in confidence found exploitation in this way in the press.

There is one ever present factor in the conduct of the advertising dental office, if they carry a pretentious front at all, and which tends to the advantage of the illusive publicity dentist, that three-fourths of the interviews are by people after they have been elsewhere without result or they are those refused as impossible by the regular private dentist.

When they have read the big advertisements, the reviving hopes of the readers impel for the morning car to the office where nature is promised can be outdone.

AT THE OFFICE OF THE "CONCERN."

The newspaper reader is met by good taste in the furnishings of the place, and is impressed, notes the orderly neatness and feels that it is a safe place, is met by the "cashier" politely offering a chair in the reception room, with the assuring remark that the "examining specialist" is engaged, "but she will see if a special effort cannot be made to see you right away." Just how soon this later arrival will take precedence will depend on certain shrewd deductions drawn for the "contractor's" guidance when he scans the card which is just placed before him. While with quiet seriousness the "cashier" has left the room for her station outside should occasion require.

For a person to shrewdly estimate the possibilities of any one of a dozen faces, with the external aids that would lend to that end, I can indicate to you the "examining specialist" in these offices as a type in a rating by himself.

Several with prior right before the "consulting specialists" may have been passed over by the more likely appearing later arrival to the loss of their turn. A tactful office maid sees to it that as little friction as possible is generated, consistent with the introduction of the interviewer, who is met with this manner of approach: "I wonder if you have seen this record. These are letters of interest written to us from satisfied patients, 'some possibly may be from your own neighborhood.'" To peruse this letter book for awhile is something somebody needed most. This is stability treatment for them—they will be slated for the next entry upon the sanctum sanctorum of the consulting specialist in the inner shrine.

With the type of individual, the approach and methods of the improved model, advertising dental office vary, in as many exhibitions of genial foxiness as there are "contractors" who from time to time succeed to the duties of the position from other offices, in the same "concern" many times, in angling the possibilities of the public's ability to pay, and investing a "contract" with the ingenious.

In the "contracting room" a "contractor" will sell anything in dentistry a patient may have her own idea about. The disposition of a particular bias for bridgework excels a golden opportunity for him, and forthwith the goose that lays the golden egg does so, gets a receipt in the form of a "contract" or "guarantee," so called, has certain indefinite memories of what it is all about, is considerably assisted with her wraps and receives an appointment card "when she is to come again" with the name of the "specialist operator" thereon, that is to have "personal charge" of her case. Not infrequently is it that a case is seen by the operator once, and then to later pass through the chairs of every operator on the place, shifted hither and thither as was expedient in the interests of "big receipts" on the appearance of a newcomer to be cared for, likely also, to engage the expert attention and skill of the "specialist operator." The interviewer assisted in the explanation of what she desired, and the "contractor" is sympathetic. No opposition is suggested in the slightest degree that the performance of such work is out of the question, as being impracticable.

The day's business culminates with an everywhere obvious pleasure in big receipts, while in the laboratory the potentialities of the morrow's personnel on the operators' day book find indication at the hands of the "contractor" for "raised contracts."

An operator may be expected to re-write the impracticable contract, as the one to which reference has just been made. The "contractor" knew all about the impracticable nature of the case involved, very likely. He at the same time was aware of the proximity of a certain sum of money, and he is there to secure that sum with all the ability experience knows how. His duties have regard for the most money-for-the-service possible to extract for any service.

I am aware that no statement is made convincing by generalities alone, so will defer to the presentation of actual facts, relating the appearance of one or two typical illustrations which were assigned persuaded of the merciful boon and benefits of teeth restored without the use of plates. One case that presented, upon examination of the mouth, possessed two solitary teeth to distinguish it. They were the two superior third molars. They were the wisdom teeth in that they had remained for a more useful period of longevity with the owner than had any of the fuller complement. They were inconspicuous in that they had only partially emerged in the mouth. The alveolar ridge describing the lines of an arc of a circle presented a smooth, wholesome condition. Upon this ridge, and with no other abutments for support of the teeth and metal that must of necessity enter into the construction of a bridgework, was swung the "restoration" upon the two third molars, upon gold crowns, cemented and fixed into the mouth. The work was "guaranteed for a life time." Provision to impress the patient was embodied in the printed "contract" against failure. It was guaranteed. The work cost more than ten times what a well fitting plate can be got for. The protective feature in the "contract" was not long becoming an operative fact, for it did fail, and as the "contract" assured the patient in the event of this contingency arising "removable work" would be replaced, the patient was supplied ordinary plates after all. Summing up the plate work was paid for with the price of the more costly bridge-work. The office retaining for their second expense of the plates the old gold from the first attempt.

In another case is the operator, in the unenviable position, as he shall not make his employers in an invidious light with respect to disillusioning that person and the impossibility that what has been promised cannot be met with performance. Sincerity to command the confidence of his charge the operator will be at peace with the "contractor"—a state of office mind very much to be desired but, if such proves not to be the result the patient has lost confidence with the operator, returns with feelings of mistrust confidently to the "contractor," whereupon the same gentleman presses an electric button, and a triangular sort of interview ensues:

"But, doctor, I was assured it would not be necessary to

extract any of my teeth. I most certainly could not have misunderstood you in that."

"Doctor ———— advises me to allow the extraction of all my front teeth. Why, I could have had that done by my own dentist at home without coming eighty miles to Boston. It was because that you advertise 'no matter how loose your teeth are, if only two remain in the mouth, we can give you a full set without the use of plates in the mouth, no matter how loose they are,' that I am here."

"You personally assured me before I paid any money or decided I would let you do the work, that my case was one that when completed would be satisfactory to the point of view of your interests as well as mine. And now you want to extract them."

The recital of this complaint incites the introspective gaze of the "contractor" upon the operator, who thus stands so charged, musing a first experience with acquiescence in all that he has heard is true. The expected happens with the vocal vibrates of a conciliatory disposition towards all, as the "contractor" resumes the lead he once had before.

"Such is quite the case as you have said, my dear Madam. I know of no reason at present why any of your teeth should be extracted."

"Doctor ———— is the specialist, and treats all cases similar to yours with extraordinary success. Naturally, in order not to hamper the doctor in the slightest degree, we impose no restriction on the advice you may receive, when, after the doctor has completed the thorough examination, always required before all concerned, to professionally advise any changes." Occasionally it occurs that supplementing the superficial examination I am able to make, that the doctor discovers conditions to modify the fulfilment of the services just precisely as I have discussed them with you. Certain conditions are not always discoverable upon the surface, it is the Specialist operator's care to safeguard any abnormalities or pathologic condition, that they may not pass without recognition and proper advice and treatment. Doctor ———— is a graduate physician, in addition to being a

dentist—and we disallow any charge for the doctor's services in that capacity."

"What seems to be the indications in this case, doctor? I should be glad if you would indicate what you have found."

Whereupon, the operator directs attention to the condition of the inferior incisors, that they incline in opposing relations in an irregularity to preclude any possible fitting of open-face crowns to their surfaces, even before they should be soldered into one retainer across the mouth. Notice is directed to the soft tissues, they are soft and spongy to the point of hemorrhage, that the teeth are extremely loose and covered with tartar. It is as well indicated that with the extraction of these teeth only two bicuspidis on either lateral of the jaw could remain. The outcome for this case decided itself on a glance. The loose, irregular condition of these teeth precluded the plaster impression, except as any, or all, might come away from the mouth in it. The indications are strong for Riggs' disease in the mouth, and the "contractor" begins with that discovery.

"Most unusual, never saw a case quite like it before, this is one of the few cases of which we have any record of in any of our offices."

"Only the experienced eye could have detected, identified this condition, doctor, and I think the patient will come to appreciate the extra services you have rendered."

In all this, the question may have, perhaps, occurred to you. Why, then, does the patient not leave the office? Why does she permit the work finally to go on, her teeth extracted, feeling, as she must, that the work promised has not been done? There is but one answer that sufficeth, simply this, the office insisted on the payment of one-half "deposit" in the beginning and it is the "contractor's" place to secure that understanding. The case, in the end, like many others, was treated as the operator advised. The patient coming many miles to consult the advertised experts was disposed of in this way. What was promised at the beginning, as contrasted with what was delivered, I have just described, and scores of cases are taken the money for that with fair dealing would redound to the credit and prestige for a needed service in the community.

As I have suggested, again, a case, upon examination, presents conditions wholly impracticable, if not impossible, and the operator may find on taking the case up the anterior, superior and inferior teeth in loose position in the mouth, the bicuspid and molars having been lost years before. The process ridge is very completely absorbed away, the only reminder of any ridge at all is a bony bed horizontally distal to the apices of the anterior teeth. In the case which I have in mind, as one that was particularly unfortunate, the depth of the incisors, especially from the incisals of the cuspid teeth on the inferior jaw down the distal wall, to where a base would be laid on the contiguous bony ridge, was as much as an inch and a half. The longest bicuspid teeth manufactured were used to substitute the missing teeth on either side, soldered to the platinum base, and to a series of open-face crowns on the anterior teeth, along their palatal surfaces, and, in the case of the inferior teeth to their lingual aspect.

The work was completed and inserted in the mouth and cemented, filling the sides of the face, was so in the way of the buccal muscles as to make the keeping clear of the occlusion difficult, lacerating the soft tissues in a way hard to imagine much less to conceive the torture of mind and body in the resultant necessities of instrumentation in such an undertaking the "deposit" payment constrained upon the patient.

With this case completed in the mouth and cemented, the patient was not able to attend her usual business. The unaccustomed cramped status of the tongue produced a lisp and a perceptible whistling with every attempt at speech. This was a case in which every indication was contra. No such work should have been even advised. But the prime, first consideration was for how-much-money-is-there-in-it? That was the function of the "contractor's" existence in the office.

When, in the turn of days, such a case would present in the operator's chair, to his care for the materializing of the "wonderful method" as the contractor had made it with those embellishments attractive, the dentist succeeds or something else, should he be unable to re-write the "contract." It is recalled that more than two hundred dollars was the price paid for the "specialist" services and the "patented method." Less than six weeks sufficed to demonstrate the permanency of the "method" I describe. It

was removed from the mouth with no little difficulty. "Removable Work" was substituted—plates—attended with the loss of the teeth which were, prior to visiting the office, in condition good enough to have worked along uninterrupted for continued service.

Of course, many trouble cases return in the course of a month. Such a case as one of these would be likely to give its originators some trouble in the course of a twelvemonth. Complaints are frequent and threatening.

The interviewer appearing skeptical and not easily persuaded to belief in all the possibilities the "method" is explained to possess is treated to an entirely and novel and what is most times acceptable, molding of opinion.

In the office the interviewer has surely read the letter book and thought, "Well, how am I to know these are bona fide," but when the person is asked to investigate personally the "satisfied patients," to see and talk with them, why, then, that is different. Very few will refuse the proffered card, with the names and addresses of nearby people, that the "contractor" dilates are enthusiastic, and for the most part these references are made use of. The interested party will leisurely investigate these connections. He feels that if his case, pronounced impossible by half a dozen reputable men to do anything for but extract and wear a plate, is within the bounds of something infinitely desirable, and the "contractor" has submitted a number of selected names of these, whose cases were identical with his own needs, so he said, he will give it a try.

The persons interviewed seemed satisfied enough and thought they had got their money's worth. So probably they had, but the case is just to this point at this time. The cases referred to for investigation bore no more likeness to the requirements of the interviewer than a wagon wheel bears to an automobile rim with a tire on it. Both are wheels, of course.

THE "CONTRACT."

Th pretentious office of the advertising kind lends creditability to its purposes and claims by what is known but little understood, the "contract." So much is impressed with this material that somehow one feels the protection of a legal contract

under it. Down to the smallest filling done, one of these "contracts" or "guarantee" takes company with the individual, showing what was done, how much was paid, and bears the signature of the "cashier" upon it, in receipt therefor. In order that the name of the "concern" shall appear signed alike from its several offices, the familiar form was kept at hand and copied longhand by the particular person employing it. Cases when completed, indicating the usual conditions, commonly encountered in everyday practise, the patient is tendered a receipt, otherwise termed a "contract" that upon its surface sets forth "Mr. Henry Jones agrees to pay Thirty-five Dollars," or some other stated amount, for certain services," the same to be rendered as the necessities of the case might require under the method." Following upon this clause, though, however, appears a succeeding condition bearing upon and to vitiate the central idea so emphasized, guaranteeing the work under the "method," which is comprehended in the reading, that, in the event of failure, "removable work" will be substituted at their expense. "Removable Work" means—Plates. Nobody ever suspects this. Possibly the use of the "contract" idea may possess some justifiable presence, if the object is to protect the customer. The design is without this mitigating quality, however, in the catering they do for the extraordinary cases "where all other dentists have failed, no matter if you have but two teeth left in your head we can give you a full set of teeth fit as youth, without the use of plates," and all that sort of buncombe. It is to attract the unusualls, the malcontents of unsatisfactory dental history elsewhere, that advertising is made seductive with this kind of bait. That the extraordinary risks do respond to the literary newspapering of the advertiser is significant. It is for this class of "prospect" the "contract" serves best, the interests of the "method." The practitioner of the professions is presumed to advise. The public confidence is a trust in that relation with acclaim is the sense of honor and dignity for its reward.

The advertiser, unprincipled, usurps the qualities of a square deal with the devices of the Gamester. The ramifying cheats and allures of the advertiser, in more than one instance, have come as a by-product of the Faro-bank and police wanted underworld of criminals.

The foregoing examples I have cited were performed under the guarantee of a "contract"—they also were disposed of according to the reading of the "contract." The very nature of the peculiar mechanical difficulties involved for a successful result to the patient could mean only temporizing at best. It was the "contractor's" ability to get the money that made the work necessary of performance by the operator. The first payment made on the contract price was entered in the proper column on the receipt, as was each subsequent payment, until the work was completed and the final payment made to complete the total. This being done, instead of the same unadded to receipt being returned to the patient untampered with, the "cashier" would stamp on the reverse side, which till now was clear, the full size stamp of an amended form—"that in the event of failure of the work, the same would be replaced with 'removable work' at their expense."

In the prelude, as a matter of fact, the work is guaranteed. And this is the sincerity underlying the transaction throughout, unsuspected by the interviewer's roseate hopes, until the thin ice precipitates chills and a ducking. Cases met with total disability in less than six months that had been guaranteed for a life time. "Removable Work" was substituted, satisfied the obligations of the "guarantee" and "removable work"—was Plates. The deception in this trick the patient is not aware of until troubles arise and the desirability that she read her "contract" is vouchsafed, and surprised ears have received the ultimatum that Riggs' disease has developed, rendering useless their ability to circumvent its ravages, that extraction remains the alternative, after all.

Fatigued into compliance, "removable work," as was written, should be substituted, in just such a situation obtaining, meets submission, and is inserted. The return from the old gold in the first work defrays the cost in producing the "removable work"—Plates, and the office has received the most money, the drawing power of the "contractor" knew how to obtain. Threats of recourse to the law for redress entrenches the "contractor" behind the "contract" and what is pointed out is explicitly expressed therein. Probably there is no other one thing among the appurtenances of the advertising dental concerns to

more entitle their rating as fakes than this one, the omnipresent "contract."

RAISED "CONTRACTS."

This is the contract written for any sum which is later increased to any other sum. The means by which a "raised contract." may be consummated are many and devious. This means of selling has its legitimate place wherever transactions are concerned with exchange of services, goods or merchandise. More often though, however, in the advertising phase of dentistry, the customary work is exchanged for a higher price, following the flood of "talk" redolent with the importuning preying upon the patient's apparent ignorance of the value of such services.

It is these detestable graft practices indigenous in such concerns and offices, in bolstering up the desire of patients to retain teeth impossible of rehabilitation, and bolstering up the leading propaganda to investigate "satisfied patient" cases never with any counterpart, that should bring the legitimate practitioner into concerted action, to aggressively see to the enactment of satisfactory laws by which the evil could be largely eliminated, supplemented by the channels of publicity to better educate the people to their evils.

And so I might continue indefinitely enumerating instances of this kind: How interviews are stimulated along the lines of least resistance, to the "contract" phase and final closing. How when a certain piece of work is "contracted" for at a certain price, "raised contracts" are affected, and much more than the first figure finds parting from even the most "careful to fully investigate" class of conservativeness. How as it is at this time, advertising dental offices are conducted in conjunction with an advertising medical quack establishment treating promiscuously cases which, in the very nature of their loathesome etiology, should require the observation, the supervision, of the profoundest medical insight. In the two connecting offices the professional forces exchange, lend in the fullest reciprocity, personal services as the nature of the trade may demand. The outer entrance to either office offers no indication of any relationship in the personnel of one office with any other. The separation of a party

wall marks the line of the separateness of interest. Community interest in this narrowest sense has had the proprietors mark doorways between, to accommodate the sporadic necessities of business.

It was in the fertile brain of just such an owner of one of these offices that was conceived the idea to locate, and was launched the scheme which has brought into publicity in this and several other cities, the flagrant practices with the doing of which every one is to some extent, at least, familiar. As a matter of contemporary knowledge there exists, and not more than a few miles from Copley Square, an office of the medical quack variety offering its services as a dental establishment, while the same operator at the chair is in charge, and legally qualified, of its medical rooms—in its calls upon his time and examination.

The determination of the identity of the “specific” lesion in the medical rooms between the instrumentation of a gold filling and the touches preceding its completion, involves no elastic imagination, or of the possibilities surrounding the dual purposes of the establishment to which I have directed some reference. Such a merger serves profits two ways—in the direction of the dental office from the medical rooms, and the advice dental patients receive, should anything in the nature of the lesion obtrude the dental operator’s field.

I shall always remember the vividness of the first impression, a lasting result of a first visit as a student in my first year in dentistry. In connection with this office was a medical museum, a part of the terrifying clinic, dwelt on in all its gruesome detail, to inspire horror, and money for a cure, from the “sower of wild oats.”

That this museum is not in existence to-day in any regular connection would seem to be its fate. Possibly the wax models and anatomical representations of a debauched human kind are fallen apart. I hope so. But the dental office remains, as does its subsidiary connection so long a twin to it.

PRACTICAL PORCELAIN WORK.*

BY D. O. M. LE CRON, D. D. S., M. D., ST. LOUIS, MO.

During the last twenty years I have devoted much time to porcelain work, experimenting with the different porcelain bodies and furnaces that were placed on the market from time to time, and feel justified in saying that this score of years I have at least surmounted some of the difficult problems in Ceramic Art in dentistry and practice it with gratifying results to-day.

The men who thought and experimented in this class of work, you can rest assured, met many failures, and I will say that my many failures in this line of work only instilled in me that desire to make investigations in order to learn the cause and how to overcome them. The last few years the mania for cast gold inlays, etc., has apparently placed porcelain on the shelf, only to revive later on, but many are condemning this class of work on account of improper manipulation and the slovenly work or lack of mechanical ingenuity, and the echo from many are gold casting is like porcelain, no good.

It is not the fault of the method or the material of either porcelain or gold, but the operator. He evidently is short of mechanical skill or has little purpose in life to become proficient in his profession. To be successful in mechanics, engineering, trades or the profession, we must cut off all the avenues of failure, and have that self-confidence to boldly face all emergencies that may arise. Any success worthy of attainment costs constant effort, and is gained only by hard work, experience and self-confidence.

Porcelain, we can say, is a most exacting mistress, and is the most unrelenting enemy to slovenliness, for its working and manipulation requires a higher degree of skill than any other work to which a dentist can be called upon to perform. To be successful we must have a knowledge of mechanics to construct our framework of platinum to receive the porcelain body: Learn to manipulate the porcelain to retain its form; ascertain the true fusion by experimenting; calculate on the shrinkage; to

*Read before the Massachusetts Dental Society, May 11, 1911.

maintain its outline; and last but not least, a good eye to blend the colors. This can only be accomplished by repeated experiments, and I may say a determined effort on our part to master the situation.

The use of porcelain embraces four distinct classes of work: Inlays, Crown, Bridges and Continuous gum work. Its use is almost unlimited to those hands who have become skillful and presents to them many ways of overcoming oral and dental deformities in an artistic manner. Porcelain as a filling material has been in use for many years, but we must learn that it is not the panacea for all dental caries, that it is not the universal filling that some enthusiasts would have it a few years since. If we select our cases for porcelain with care and unbiased discretion, then we shall be putting porcelain fillings on a firm base and with a reputation second only to gold as a filling material.

In porcelain inlay work we must first consider the location in determining the case, and remember that each operation presents in some degree different requirements, and so directing our efforts that our artistic sense will have the freest play possible, consistent with the mechanical principles involved. It is the most artistic filling, and its utility cannot be questioned for the anterior teeth and buccal cavities, also on occlusal surfaces, but only when sufficient porcelain can be applied to assure bulk to withstand the force of mastication. The first step is a most definite idea of cavity preparation to be successful, and to do this necessitates a most exacting and systematic work. When occlusal stress is to be resisted, the cavity should be shaped that the force will drive the inlay against tooth structure with a definite idea for the retention of the inlay and the anchorage must be made sufficient to withstand the force of mastication and provide firm retention of the inlay within the cavity. Always keep in mind the point of stress, we must make the resistance and retentive form so that the greatest retention is at that point.

In cavity preparation closely study the amount of force and the direction the inlay will be subjected to and keep in mind that it must be retained by the mechanical relation of the same to the tooth, extend the cavity, as case in hand indicates, for mechanical retention and determine upon the removal of the matrix in a certain direction and cut the walls accordingly. In forming the

matrix many have advocated burnishing direct to the cavity; many cavities, I can get better results by taking a sharp impression with modeling compound and packing the same with copper amalgam. When sufficiently hard the .001 thickness of platinum for matrix can most readily be adjusted with damp cotton and burnished to the walls and over the margins of the cavity, and with the Ashes water-bag swager, the matrix is most accurately adapted to all parts of the cavity, and then the matrix can be trimmed roughly to the outline. To prevent the matrix from tearing, work it gently to the floor of the cavity with a suitable soft piece of wood and adapt roughly to same| Don't pay any attention to the creases or folds it causes to the matrix, the damp cotton and the burnisher will care for them later. When suitably formed on the amalgam die, it is carried to the mouth for final burnishing and perfect adjustment to the cavity. Now, as to the procedure in baking and the application of the porcelain body, I have adopted the following method after closely observing the underlying colors of the tooth to get proper shade of porcelain to build the inlay. In selecting colors I find the best results by the use of two fundamental colors; one to produce the color of the dentine and the other the incisal edge of the tooth. In building up your porcelain in the matrix reproduce as near as possible the color and especially the form of the dentine as it was originally and the result is most satisfactory. Let me say here that one of the phases of inlay work is the difficulty on obtaining colors that accurately match the natural teeth. It is impossible for any other person to teach you color schemes; instinct, patience and experience must be your teacher.

The method of constructing inlays with two bodies of different fusibility as the so-called foundation and enamel bodies that are manufactured are the correct ones. The foundation body should be applied in and over the matrix and be contoured to replace the dentine. The colors are applied separately and merely biscuited, then the enamel placed to contour over the entire mass and properly fused. The accuracy of fusing the porcelain will be the uniformity of color, strength and perfection of the inlay; therefore, it is of the utmost value to learn the true baking or fusion of same. Experience has proven to me that when porcelain inlays are well put in, decay does not recur, and it is a per-

manent filling. It is not affected by thermal changes, and I assure you it is esthetic in the extreme, and that is why I advocate porcelain inlays.

I am not going to lay down anything new in the line of technique in the construction of a porcelain crown. You may ask why I advocate the porcelain crown. It is stronger if properly fused than a Richmond Crown, as the porcelain is actually fused to the back of the facing, making it one continuous mass of porcelain, not depending on the two small platinum pins of the latter for its strength.

Operations on the eight anterior teeth should generally be influenced by appearance and those on the posterior by utility. Invariably mechanical principles govern the application and general conditions must be considered as to force of the occlusion, direction and character of the teeth to be crowned and endeavor to secure that perfect imitation of nature which is the high mark of perfection. This can only be accomplished with perfect results by the man with the furnace, that has learned by experience its requirements and the manipulation of porcelain, then he has the means at hand to overcome any operation that many would consider impossible. We can produce a variety of crowns sufficient to cover any case that may present itself, such as the Dowell Pin Crowns with band, half band or saddle back, section crown, Tube Crown and banded tube crowns, also Jacket Crowns, etc.

With these unlimited methods of constructing crowns, we are not called on to place a ready made crown, but can adapt the crown most suitable for the case in hand with results that will be most satisfactory for the patient and gratifying to the operator.

In the construction of the platinum base of a crown we must consider its occlusion and the function the post exerts and resists in its incasement and foundation. The base made without the collar or band fitted to a flat end of a root does not afford positive resistance to lateral pressure in supporting a crown. It can, however, be quite effectually accomplished by giving a deep curve making it V-shaped to the surface of the end of the root as resistance requirements suggest; to adjust the platinum base to end of root after the dowel is forced through the platinum base adapt it roughly to end of root, then withdraw the same and solder the

base to pin with platinum solder; replace on root and with mechanical mallet you can most accurately draw it down and adjust to the end of the root. The impression is taken, the model made, the facing is ground and adjusted on model, pins bent down in contact with post or base and invested and soldered. The porcelain of required color is packed and contoured, as in all porcelain work; the first baking with foundation body, making separation on account of shrinkage and finish with the enamel body.

The proper shading of a crown calls for the exercise of artistic skill, and by the proper blending of the desired tints very natural effects can be produced. It is not permissible here to enter into the various methods of constructing porcelain crowns, as the literature on the subject a few years since covered all.

To the skilled dentist, well versed in porcelain, bridge-work for the anterior teeth does not present extreme difficulty, but due respect must be paid to the mechanical principles of the leverage and the force of mastication.

In studying the conditions for the application for porcelain bridge-work, we must take into consideration the friable material and remember we must have thickness or bulk to insure strength. Many cases present themselves where great absorption has taken place, and conditions where ample space exists are most favorable for porcelain. In close bites and where great force is exercised or where the bridge is of too great length, porcelain is unequal to the strain. The metal structural frame of platinum and irido platinum must be constructed to afford a strong and unyielding base. The various parts must be assembled in a manner that no change in their relation take place from the shrinkage of the porcelain in fusing. This can be accomplished by using 25 per cent. platinum solder in constructing the framework and also the attachment of the facing. In applying the porcelain it must be remembered that the mass of porcelain with its first application must be divided into small sections on account of shrinkage. Two fusing will usually complete the case if we use a high fusing body and the porcelain contoured and applied properly.

Porcelain bridges for the anterior teeth. When sufficient porcelain can be applied to assure bulk to withstand the force exerted, I am sure its utility cannot be questioned. If constructed

on mechanical principles and for artistic appearance it is nature's duplicate.

I will next call your attention to a porcelain process that offers greater aesthetic possibilities than those of any other method of prosthetic restoration. By the means of a well constructed artificial denture of continuous gum, the physical characteristics relating to the appearance of the restored tissues may be so closely imitated as to defy detection.

Platinum and iridio platinum are used as the bases, and we find the tissues of the mouth react more kindly to the presence of a platinum base-plate than they do to any other metal or of the vegetable bases. All the material used of which this is composed being good conductors, the thermal variations are readily communicated to all the underlying parts. The continuous gum plate stands alone from a hygienic standpoint. The denture is absolutely uninfluenced by the secretion of the mouth, as there are no places to catch food debris, it may be made as clean and fresh as new by ordinary cleansing methods which may be instituted by the patient.

Any loss of gum or palatal contour may be so faithfully reproduced in form or color that the natural organs are most accurately imitated.

I will not encroach on your time by going into detail of its construction (but in my clinic on porcelain, I will endeavor to give you a most comprehensive idea with models, as I gave it in clinic this morning, every little step that is required to construct this most beautiful denture). In passing, I wish to say that continuous gum dentures are applicable with most satisfactory results in full cases, upper and lower, and it is quite possible to employ them with good effect in many cases requiring partial dentures. Among the many difficulties that present themselves to the practitioner is the reproduction in porcelain of defects and stains, as found in the natural teeth, but this is overcome by the application of oil colors or mineral paints. These stains are applied on or around the cervical margins, the cutting edges, occlusal surfaces, or any other portion of the tooth imitating those discolorations seen in the recession of the gums, devitalized or decayed teeth and mechanical abrasion.

There are often conditions of the natural organs, associated

with decay and discoloration, which may be imitated in the porcelain teeth by the judicious application of mineral stains. The method of applying and fusing these paints may be readily learned, and by a little study in the mixing and blending of colors will enable the operator to produce very correct imitations of the natural teeth. By grinding the cusp or edges of the teeth previous to staining the effect is still more pleasing when you wish to imitate the wear incident to age, etc.

There is no limit to the possibilities in the hands of one that has become expert, offered by this process, he can readily imitate the pitting or any other defects of structure which are often found in the natural teeth.

In closing, I will say no work in dentistry requires the delicacy of manipulation that is encountered in porcelain work, and it can only be acquired by diligent application and a persevering effort on the part of the operator. Do not get discouraged if your first production should not be in accordance with your ideas of harmony and correctness, but go at it again with a determination that you will be master. Develop that delicacy of manipulation and I assure you that with a fair degree of intelligence and perseverance you will be able to master porcelain work and apply it most successfully in the mouth. Don't be satisfied with the ease with which plastic filling material is introduced that requires no skill and leads to most careless manipulation. Endeavor to develop that manipulative skill together with the artistic perception that it will add to your professional calling. Keep in mind the appropriate saying of one of Massachusetts' noble sons, Ralph Waldo Emerson, "If a man shall do a piece of work incomparably better than his fellows, the world will make a pathway to his door though he live in a forest."

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, December 6th, 1910, at the Academy of Medicine, No. 17 West Forty-third Street, New York City.

The President, Dr. S. E. Davenport, occupied the chair and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

REPORT OF THE RESEARCH COMMITTEE.

Dr. J. Morgan Howe—The Committee on Research would report that Professor Gies has very kindly indicated his willingness to undertake the work of further investigation during the coming season, and intends to study the bacteriology of the beginning and progress of decay of teeth, and it may be in some cases, of pyorrhea. The work is to begin at once, and progress through the season. Professor Gies has prepared a scheme of work to be pursued which may be considered a part of this report. I am sure we all appreciate Professor Gies' liberality in giving his time and trained experience to the elucidation of problems such as ours, for we believe that the only hope of their solution depends on the help of scientific men who are able and willing, for the scientific interest in it, and for the sake of humanity.

Dr. C. C. Linton—Dr. Ainsworth of Boston gave a very interesting clinic this afternoon, preparing and filling a compound cavity in a second bicuspid with gold, using a matrix. There were about fifteen present, and all were much interested.

The President—The first gentleman who is to speak this evening is one of our Boston members, who has occasionally favored us in the past, and always to our satisfaction and instruction. If I were to ask the younger members to-night for what George C. Ainsworth stands, and with what his name is connected more than any other one thing, I am sure their reply would be "Why, Dr. Ainsworth designed and perfected the well-known Ainsworth fixture for work in orthodontia—one of the most valuable appliances known—to say nothing of his development of the inclined plane." But we older members understand perfectly well that long before the Ainsworth appliance was even thought of by

its author, he was recognized as a high exponent of contour gold filling—that splendid old-fashioned way of preserving teeth.

Dr. Ainsworth comes to-night to speak upon his use of the matrix and gold for contouring. As Dr. Linton has told us, Dr. Ainsworth gave a clinic this afternoon to which a number responded, and we will now listen while he tells us the theoretical side.

Dr. George C. Ainsworth—Mr. President and fellow members of the Institute, I thank you most heartily for your kind reception.

The subject on which I speak to you this evening, following the clinic of this afternoon, is a very interesting one to me. I wish to speak of the methods I have come to adopt with the greatest satisfaction, after an experience of more than thirty-five years, and if any are able to appropriate anything that may be helpful I should be pleased.

The restoration of the natural shapes of the teeth I believe is quite universally acknowledged as the best mode of practice to-day, and what I shall say will have reference entirely to the restoration of the approximal surfaces of the bicuspid and molars.

It was my good fortune to study dentistry with an old school practitioner who was uncompromising in his advocacy of the restoration of the shapes of the teeth, and the preservation of the sixth year molars, although their sacrifice was generally advocated by many high class practitioners at that time in Boston. Hence, I early imbibed a wholesome respect for the preservation of the natural contour of the teeth. My convictions at that time were greatly strengthened and the logical sequence formulated through reading a paper by one of the most progressive, scientific and skillful men in our profession. I refer to the paper on the "Management of Proximal Surfaces of Bicuspids and Molars," by Safford G. Perry, published in the *Cosmes* of 1879. This paper contains the most logical, practical and scientific treatment of the subject I have ever read, so simple and so convincing. Dr. Perry not only "blazed the trail," but pointed out in the most convincing way, through services rendered in mouths of his patients, as well as in his own mouth, at the hands of one of the most skillful operators of the day, both the advantages to be gained through full

restorations and proper enlargement of these cavities, thus anticipating by many years all that has been written under the heading of "Extension for Prevention." Those who are interested in this subject cannot do better than to turn to this paper and study it carefully. My earliest recollection of contour work at the hands of my preceptor was commencing the filling from retaining points at the base of the cavity, gradually building out over the cervical wall piece by piece with cohesive foil, and then up the sides through a long, laborious operation to the completion of the filling. This work was often handicapped by lack of space to give the proper contour, and my earliest recollection of obtaining space for the contour is of hickory wedges driven forcibly through at the time of the sitting—a method which was not pleasing to the patient and not very satisfactory to the operator. Various methods followed this, one of the best of which perhaps was the use of waxed tape drawn between the teeth, changed at intervals of a few days, until the desired space was attained for proper contours. This necessitated a large number of visits and consumed much valuable time and was altogether quite unsatisfactory.

Then came the mechanical separators of various kinds, the most valuable of which in my hands has been the "Perry"—but even that I use very little to-day, as the method I am about to describe accomplishes all ordinary separation as it progresses.

My earliest thought on the matrix was inspired by the matrix as introduced by Dr. Louis Jack, which most of you, especially the older members, are familiar with; but it had its limitations. Being made of a heavy, thick material, it was often impossible to adjust them properly. Following the same idea, I made some dies to correspond with the shapes of the approximal surfaces of the molars, and swedged matrices from soft metal, which were used for a time with indifferent success; sometimes perforating them at the cervico-palatal and cervico-lingual edges, passing a ligature through these perforations in such a manner as to hold them to a nice adjustment to the cavity. Later I developed the idea of using thin cold rolled French steel, cutting out the proper shape, and with a ball-burnisher, on a large piece of Faber's erasive rubber, forming it to approximately correspond to the surface to be restored. This metal, while being springy, is susceptible to being burnished to any contour desired, and when

properly adjusted to plane serves admirably to influence the shape of the filling as it progresses, so that when completed it leaves little to be desired as regards contour. This method has remained with me until this day, giving me the greatest satisfaction.

Regarding cavity formation, I see no reason why we should not take Nature as a guide—not only for the restoration of the teeth, but for the formation of the cavity. Teeth are attacked by decay in a certain zone on the approximal surface. Why is it necessary to extend the cavity much beyond the decay? If we restore the original relation, only the zone that has decayed is likely to be attacked by decay again, and I cannot figure out why it is necessary to enlarge that cavity materially in one direction more than another, presuming, of course, that the cavity is large enough to expose the joint between the gold and enamel wall to friction. The enlarging of the cavity is attended with more or less pain, discomfort and labor, as much as possible of which it is desirable to avoid. Inserting the gold by the use of the matrix, I am able to fill it perfectly; and if restored to its original relations I do not see that one part of that cavity is more susceptible to a recurrence of decay than another, provided the work is well done. So then my preparation of the cervical wall is in accordance with the shape that decay has made—enlarging, of course, sufficiently to get to a good strong wall and opening up to the grinding surface sufficiently to insert the filling properly.

Having done that, and opened the cavity sufficiently to expose the joint between the gold and perpendicular enamel wall to the friction of mastication, so that it may be kept clean, I feel I have enlarged the cavity all that is necessary; having prepared the matrix as before described it is now adjusted to position. I have prepared on these models which I hold in my hand, four cavities with matrices adjusted, showing four different ways of holding them. I do not adhere to any one method in that respect, but use what seems to me best adapted for the case in hand.

Here is one case where the matrix is held by a Perry separator, with a piece of orange-wood toothpick at the cervical wall just tight enough to hold the matrix against the cervical wall. It is important that the jaws of the separator shall rest away from the periphery of the cavity, so that the force used in packing the cylinders of soft gold may spring the matrix off a bit, resulting

in a uniform fullness of the proper shape. At the cervical wall, that part of the filling most difficult to finish, and most likely to be injured by the use of cutting instruments and files, scarcely more than a good burnishing will be found necessary. As the filling approaches the grinding surface a little extra fullness may be found, but it is at a point easily accessible and therefore easily finished by the use of sandpaper disks, etc.

By this mode of procedure, we find, even where the space seems at the beginning quite insufficient to permit of the proper contour, that the force, by hand-pressure, of packing the gold against the matrix, forces the teeth apart, resulting usually in all that could be desired in the matter of contour.

On the other side of the model here we have practically the same conditions, excepting that the matrix is held in position by an ivory clamp designed for the purpose. On the upper again the same conditions, only the matrix is held simply by a piece of orange-wood toothpick adjusted between the teeth opposite the cervical wall, which will often suffice. And still again, on this side, I have taken advantage of the cavity in the tooth approximating crowding baseplate gutta percha in it to hold the matrix. Care must be taken in all these adjustments not to hold the matrix too rigidly against the tooth, making it difficult to flush the gold over all the cavity periphery. A little experience will enable one to accomplish the desired result with great positiveness. The edges of the cavity are bevelled a little, and in my hands such fillings have given me the greatest satisfaction. The subsequent failures at the cervical wall are very few indeed. The preservation of fillings in the mouth, if they are skilfully done, depends as much on the care of the patient as on the skill of the operator.

This matrix, with the contour burnished into it, seems to me more simple and better adapted for the work than any commercial matrix I have ever seen; it requires but a moment to cut and form it, and after serving the purpose, may be thrown away, thus saving the trouble of sterilization.

Any good soft working gold may be used by this method, the major part of the filling is packed quite rapidly by hand pressure, using rather large cylinders, as they come from the manufacturer, without re-annealing. Trifling undercuts or irregularities are necessary until we approach the grinding surface,

when I lay aside the cylinders and take up cohesive ribbons No. 40, freshly annealed. After filling the undercuts, I proceed to complete the filling, usually with rope gold. Someone has asked why I change from one form of gold to another in filling the undercuts. My reason is this: I use a smaller point, which would be likely to perforate the more fluffy cylinders forced to place and there is body enough ahead of the point to carry the gold home to the bottom of the undercut. After I have filled in the undercuts, I prefer to use gold in rope form because it seems to fill up faster, I can use larger instruments without danger of chopping it and when finished there is less liability of having a pitted surface. I use instruments with very fine serrations as a rule. One of my favorite points is an instrument broken in such a way that the crystalline surface of the fracture serves as serrations and packs the gold very smoothly.

Summing up the advantages of this method of filling over my former methods, without the matrix, I am enabled to save twenty-five per cent. of the time in making the filling. I am enabled to place non-cohesive or soft gold for the major part of the filling, which is a better insurance against future decay, and when I come to the finishing—the major part of the cavity requires only the burnisher or a finishing strip—scarcely anything in the shape of a file. What finishing remains to be done is near the top, and easily accessible with sandpaper discs and proper burs. Corrugated burnishers in the engine serve me well in burnishing the grinding surface.

If there are any questions in connection with this method of operating I shall be glad to answer them if I can.

Dr. Wilson—For getting space Dr. Ainsworth depends upon the force he exerts upon the matrix in packing the gold.

Dr. Ainsworth—Whereas I formerly made appointments for changing wedges, again and again, the cases to-day are rare where I insert a wedge. There are cases where the teeth are badly broken down, and have moved much out of position. In such cases I prepare the cavity to some extent and put in what I call a wedge filling of base plate gutta percha to be worn for several weeks or months as the case may require. In finishing the filling I sometimes apply the separator for a few moments.

Excepting these cases, I rarely insert a wedge. The packing

of the gold against the matrix contours the filling all that I desire

Dr. Linton—Does Dr. Ainsworth use this form of matrix in making amalgam fillings?

Dr. Ainsworth—Yes, but with amalgam there is more reason for previous wedging owing to the nature of the filling material.

Dr. Linton—Does Dr. Ainsworth have any trouble removing the matrix after the use of amalgam?

Dr. Ainsworth—There are tricks in all these things. When making gold fillings there is no trouble. With amalgam it might be an advantage to hold the finger or a ball of cotton firmly on the grinding surface of the filling while with pliers the matrix is drawn out buccally.

Another condition I have neglected to speak of, it often occurs that we have an upper bicuspid which seems too good to cut and crown, nerve alive perhaps and yet so badly decayed mesially and distally as to preclude the possibility of forming undercuts to sufficiently insure stability of the fillings. The time and labor necessary to insert the two fillings at once, in the ordinary way, is prohibitive. I find a happy solution by putting on a double matrix—or two single matrices—being supported in whatever way seems best, and then fill both sides as I have described, requiring very little retention at the cervical or upright walls, and then uniting at the top with cohesive foil, making one splendid filling, which will do service for years, so much preferable to a crown. With the matrix I am able to insert such a filling in a much shorter time than without it. Perhaps an hour to an hour and a half would be sufficient to insert the gold in a very large double filling of this kind, and the finishing is reduced to a minimum as I have already said, by the fact that the shape of the filling at the cervical wall, and the surplus, is so near correct. I do not fill saucer-shaped cavities with the matrix. There must be some irregularity to prevent the gold from sliding and a little undercut.

Dr. Prentiss—Does the Doctor ever remove the matrix just before the strongest point of contact is reached?

Dr. Ainsworth—No, though I find the Perry separator a very valuable adjunct in an emergency.

That brings another thought to mind in regard to the point of contact. In accepting Nature as guide in the matter, there are teeth that simple knuckle at one point and others touch in a

broad contact, between the molars for instance. As the gold is packed against the matrix it is pressed against that broad contact of its fellow, so that when ready to finish it is easy to reproduce the original broad contact of nature. In the bicuspid the contact is apt to be smaller. I invariably keep the matrix on until the filling is completed.

Someone has asked about the burnishers I use. Burnishing is an important part of the work, and I have found it desirable to have some specials which I have formed myself sent to manufacturers to temper and polish.

By this method the major part of the filling is inserted by hand pressure, which is frequently more agreeable to the patient than malleting from beginning to end. All this unannealed foil is inserted by hand pressure, and at times, where it is difficult to get at it with the mallet, I complete it with hand pressure. Sometimes I burnish on the last two or three pieces, especially if I have a large surface on a molar.

The President—It is easy to see that Dr. Ainsworth is an enthusiast, who believes not only in his method, but in himself. A young dentist who has had the privilege of watching Dr. Ainsworth operate recently informed me that one of the things he noticed particularly in Dr. Ainsworth's work was that so few instruments were used during a long operation—a pretty sure sign of an expert operator.

I recollect seeing Dr. William H. Atkinson, many years ago, make a filling at a clinic in a Massachusetts city. Those who saw him work will recollect that that gentleman often wore no coat while operating, his shirt-sleeves being very much in evidence—and this filling was made while talking and gesticulating, the instruction being of great value. Dr. Atkinson made a remark at that time which bears directly on what has been said to us this evening. It was this: That if a dentist was in favor of his work, loved it and was earnest, he did not need all of the expensive sets of instruments that our dental supply dealers are so anxious to sell to us; but that a dentist of the right sort could make a good filling with an old nail.

The address given by Dr. Ainsworth is now open for discussion.

DISCUSSION OF DR. AINSWORTH'S ADDRESS.

Dr. Wheeler—It may be of benefit to those who are interested in this matrix—I believe I use the same steel—to know that the thickness of the steel is .003 of an inch, though it is procurable as thin as .001 of an inch. It is an imported French steel, and I buy mine of Herman Baker, 101-103 Duane Street, New York City.

Dr. Ainsworth—I believe I get it from Frasse, on Fulton Street.

Dr. Dunning—I have been extremely interested in what Dr. Ainsworth has shown us. I have never personally been very successful in handling a matrix in filling a cavity with gold, because I have feared trouble in adapting the gold at the junction formed by the matrix and the enamel margin. I have always wanted more freedom to build a surplus to be worked down in finishing, without being limited by the form of the matrix. The matrix is a great help in plastic work, and I should like to ask Dr. Ainsworth if he has tried placing a matrix of this sort to be held simply by its shape? This hint was given me by Dr. J. F. P. Hodson, and I have found it very useful. He removes all temper from a piece of steel and with a little lead block and a nail with a rounded head, he swages it to the proper shape in much the same way that Dr. Ainsworth burnishes. This steel is too heavy to burnish. The swaging revives the temper, so it is quite rigid when formed and is quite springy. He makes the contour he wishes, and this piece of metal is then sprung between the teeth, the concave side of course facing the cavity to be filled. It is held only by the spring of the metal. It hugs the cervical margin, and the other margins, and the bulge projects with such force against the opposite tooth as to hold it. I have found that very useful for amalgam fillings. Dr. Hodson seems to find the same satisfaction in filling with gold, but of that I cannot speak. This matrix may be removed by snapping out with a strong, sharp-pointed instrument.

In placing an amalgam filling, the spring will so wedge the teeth apart as to just about compensate for the thickness of the steel; and when removing the matrix, the tooth will fall back, making a perfect contact. It is well to leave the matrix in place over night, while the amalgam is setting, and it is so small and smooth that the patient is not annoyed by having it there.

Dr. T. W. Onderdonk—I would like to call Dr. Ainsworth's attention to the way I prepare my matrix. My trick is in the way of cutting. It is cut in a semi-circle and can either be put around one tooth, or around two. I also have an instrument for holding it. The amount of contour is determined by the amount of curvature. Another advantage which I consider my matrix has is that after the cavity is half filled, I take it off and burnish the filling material over the cervical wall, filling them solidly against the adjoining tooth. I have used that for a good many years.

Dr. Ainsworth—Dr. Onderdonk has given up gold fillings for gold inlays?

Dr. Onderdonk—Entirely.

Dr. Ainsworth—That is what I am sorry to hear, and may I ask why?

Dr. Onderdonk—I think it saves the tooth better.

Dr. J. Morgan Howe—I had the pleasure of seeing Dr. Ainsworth fill a cavity this afternoon, with gold, with the matrix on as he described very lucidly this evening. I took a great deal of pleasure and satisfaction in seeing the skill with which he worked, and the expeditious manner in which he accomplished what would have been ordinarily a rather tedious operation—a large, compound mesial cavity in an upper bicuspid.

The use of soft gold in a large part of the cavity, toward the cervix, followed by cohesive gold as he has described, demonstrated, after the matrix was removed, the presence of a sufficient surplus of gold to be burnished down and make practically a complete and finished filling. That is what it almost amounted to, after he had burnished it down, and I was very much interested and obliged to him for showing us the patterns of burnishers with which he accomplished this work so expeditiously.

One of the things I am sure we have all held in pleasant memory in regard to Dr. Ainsworth has been that he has always had something to tell us, and never has had anything to hold back, nor has he had any commercial string tied to anything he presented to us. For that we always feel like cheering when Dr. Ainsworth comes here.

Dr. J. W. Canaday, of Albany—I am much pleased to be able to be here and I had a great deal of satisfaction in seeing the clinic this afternoon, and observing the very skilful manner in

which the work was executed by Dr. Ainsworth. I have seen a great deal of work of this description where non-cohesive or soft gold was used for the major portion of the approximal filling, the finishing at the surface of wear being of cohesive gold, and I know it may be successfully accomplished after the manner Dr. Ainsworth has described, making permanent restorations and very useful work.

Dr. Ainsworth—I forgot to mention that in the past I have used, and do now occasionally, a cylinder made of half tin and half gold at the cervical wall, but experience seems to indicate that gold, as I use it, serves every purpose. I am not now familiar enough with the different commercial matrices to criticise them. I prefer the one I am now using. The one which screws against the tooth, and acts as a separator gives too rigid a contact with the tooth to insure a flush filling.

As I have said, in a very large percentage of cases I do not now use a separator—it is only in the extreme cases that are badly broken down. If we use a double thick matrix, we must have more separation, and carry the separation beyond what would be necessary for a single matrix, besides multiplying the work unnecessarily.

In regard to the matrix Dr. Onderdonk speaks of—the soft metal matrix—I fail to see why he uses a matrix at all if he feels he must remove it two or three times during the process of filling in order to finish the filling as it progresses. It seems to me it would be easier to fill and finish without the matrix. It must consume much time. A soft metal matrix is easily bent out of shape and therefore of little assistance in shaping the filling as it progresses. It seems to me much preferable to pack against a polished steel surface, the contour burnished into the matrix is then approximately the form of the tooth. This form of matrix does not appeal to me personally.

Dr. T. W. Onderdonk read a paper, entitled “An Interesting Case in Practice.”

(For Dr. Onderdonk’s paper see page 113.)

DISCUSSION ON DR. ONDERDONK’S PAPER.

Dr. Karl C. Smith—A number of years ago, a case came under my observation, that was quite similar in character to the one just reported. A patient came to my hands several successive

times with a tooth excessively sore, and in such condition of pain that it was nearly impossible to do anything. In the first instance, I tried the means Dr. Onderdonk described, opening the tooth, expecting to find a dead pulp, but I found it alive, and in such condition that I found it necessary to extract. There was a great absorption of the tip of the root. A few weeks afterwards the patient reported another tooth in the same condition which I immediately extracted, and shortly after that a third, with the same condition, and in each case I found at least one-sixteenth of the root absorbed. A few weeks afterward the patient died! very suddenly from diabetes, which had not been suspected, although her husband was a physician.

Dr. Tracy—Did Dr. Onderdonk use a radiograph to find out the condition at the apex of the root?

Dr. MacNaughton—I had a case something like that of Dr. Smith's in that there were two teeth involved, right and left upper molars, with about six months' interval between attacks. Both times I thought the cause to be absorption of apex of root and irritated pulp as a result and for which my treatment has been devitalization. The lady not being a patient of mine and wishing only temporary treatment, I did not make application to destroy pulp, but did what else I could. Afterwards I learned that the pain continued for several days. Immediately on her return to the city in the Fall, she called again. For the previous four or five weeks she had suffered constantly with severe pain on the left side of the face from which she was unable to get relief. Her dentist, who had very thoroughly cared for her teeth during the Summer, assured her that the teeth were not the cause. Examination showed the second molar to be tender to percussion and sensitive to cold. There were no cavities and no fillings. An application of "Arsenic" (Buckley's formula) was made to the very sensitive dentine, and in five hours she had relief for the first time in weeks. The roots were afterwards filled and there has been no pain since.

Dr. H. C. Ferris—I would like to see a model of this mouth as it seems to agree with several I have seen, where there is auto-intoxication owing to bolting of food, and a large consumption of sodium chloride where the fecal analysis showed an excessive quantity of vegetables and meat fibre.

Dr. Onderdonk—Dr. Tracy asked about the apex. I think that was all right. The pulps were taken out intact, and the openings were not large. I could not pass a broach through. I do not think they were absorbed.

In Dr. MacNaughton's case, I rather suspect pulp stone. In regard to Dr. Ferris' suggestion, my patient chewed his food thoroughly, I believe. My opinion is that the man has some constitutional trouble, but just what it is, I do not know. In my practice, I think this is about the fourth case I have observed. Three of them died very shortly after observing this condition. I think this trouble is caused partially by poor circulation, and that it has become gangrenous.

Dr. George A. Wilson, Jr., then read a paper entitled, "Little Time Savers: Practical Helps in our Daily Work."

(For Dr. Wilson's paper see page 115.)

The President—We have heard from Dr. Wilson, Jr. This is the first paper we have been favored with from him, and we note the splendid effort he has made. We shall expect him to become one of our very best. The paper is now open to discussion.

DISCUSSION OF DR. WILSON'S PAPER.

Dr. George Palmer—Does Dr. Wilson leave the alcohol in the hypodermic syringe?

Dr. J. Morgan Howe—I understood Dr. Wilson to say alcohol, followed by glycerine, was the one known antidote for carbolic acid burns. I would recall to his mind that vinegar is a potent natidote to carbolic acid also.

Dr. MacNaughton—In regard to this wire for investments. The metal lath used by plasterers is good. It is rigid and the investment material takes a good hold of it. I prefer it to the wire netting.

Dr. Wilson, Jr.—Replying to Dr. Palmer, the alochol is drawn into the syringe, and is left there. It is preservative, whereas if water be left in, either the syringe dries out, or the water disintegrates the fibre or leather packing. Ninety-five per cent. alcohol is used.

Points of greater value are often brought out in the discussion than in the paper, and I am glad to hear what Dr. Howe has said. I have been some years in practice, and at the time we studied the subject, alcohol was stated as perhaps the only antidote. I am very glad to know that vinegar is a good antidote for slight burns on the soft tissues or lips.

The wire suggested by Dr. MacNaughton, I am not familiar with. What I referred to is a product of the White Co., and

far in advance of what I have been using—sheets of tin clinched together. The tin held the moisture, and did not allow the radiation of heat. This gives a better radiation, and permits the moisture to pass off as well.

The President—Because of the cordial reception given to our various essayists, I think they all feel we have already expressed our obligation to them for what they have done for us. As they are all members of the Society, it is hardly usual for us to give formal thanks, for they are of us, and it is a pleasure and gratification to them to come and do what they can.

We are especially obligated to Dr. Geo. A. Wilson, Jr., for the care he has taken in preparing these different specimens for little object lessons to us, in illustration of his ideas.

Dr. Ainsworth—I shall be very glad to see any member of the Institute at my office when in Boston where I can perhaps better exemplify these ideas. I have found much pleasure and advantage in this method of operating, but I realize, it is not one observation that convinces—it is the same thing again and again—a number of times, before one is able to grasp and appreciate what there may be in any subject.

The President—We thank Dr. Ainsworth for his cordial invitation; from personal experience I know it to be a sincere one.

Adjournment.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, January 3rd, 1911, at the Academy of Medicine, New York City.

The President, Dr. S. E. Davenport, occupied the chair and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

Dr. H. L. Wheeler—I wish to report that the original essayist for this evening is ill and unable to come. Dr. Dawbarn, Dr. Janeway and Dr. Green have very kindly consented, on short notice, to give us something of value and interest, without much time to prepare themselves. For the Executive Committee, I would like to say that we doubly appreciate their most courteous service.

COMMUNICATIONS ON THEORY AND PRACTICE.

The President—The Executive Committee has secured the attendance of our member, Dr. L. C. Leroy, who will speak to us regarding the use of some new pyorrhea instrument. It is known that Dr. Leroy has given much attention to the treatment of pyorrhea, and while he has said something about it before various small societies, this is the first time he has favored us, and we welcome him gladly.

DR. L. C. LEROY—*Mr. Chairman and Gentlemen*—I have taken advantage of my name appearing on our programme to make a few notes of what I wished to say, and incidentally to present for inspection a set of pyorrhetic instruments I have devised. I thought also it might be of interest to see a few of the scalers used by men preceding Dr. Riggs and his pyorrhetic work. Probably they are new to many.

I have here a sample of the five by nine inch glass trays which I use for holding my instruments. You will notice in my set of instruments that the shapes of the shanks make the difference in the instrument. The working end of the blades of all are alike.

It has been proved quite conclusively that the most important element in the treatment of the disease in question is the removal of the adhesions, and in proportion as we are successful in this do we establish cures. It has been proven further, to my

satisfaction, that instrumentation is the only way to accomplish this. Vaccination, cauterization, local or general, or local and general medication, thermaization (the use of violet light rays, etc.) have all been demonstrated to have some value in reducing, some, if not all, the inflammation; which means that the toxins were reduced, the parts stimulated, and so toned that that marvelous force, "vital energy," had, in the above-mentioned direction, some small hope of co-operation held out to it. Even the greatest enthusiast of any theory, however, has, each one of them, been obliged to admit finally, as a necessary procedure, the removal of the deposits by instrumentation.

Dr. Johnson, in his "Operative Dentistry," says: "It is extremely important in all operations involving the gingival tissues that the rope-like border surrounding the cervix of the tooth be not severed or mutilated. It recovers slowly, and is seldom reproduced like the original."

To conserve this border and to thoroughly remove all the deposits with as little pain to the patient as possible, is the great desire. The instruments on the market were inadequate for my requirements. These that I show are the product of years of investigation and experimentation. I shall try to describe them. Each instrument has the same type of blade end. What we desire is an instrument that can be introduced easily into the deepest pyorrhetic pocket without mutilating the tissues; that will reach beyond the deposits without causing pain by distending tissue, or that will be impeded by the alveolus; an instrument that not only dislodges while pushing, but is also operative on the return stroke; an instrument, delicate, so as to assist rather than interfere with the sense of touch—strong and quite rigid, for much power is often required to break down calcular adhesions; an instrument that will not disfigure the root, but tend toward finishing the surface; an instrument that is effective as well when moved laterally.

The shank of the instrument is so shaped as to follow the contour of the root, and does not distend the gum tissue unduly, which interferes least with the delicate manipulation of the working point.

The effect of such an arrangement of blade to shank is to

make of the instrument a plane whereby the working end can be controlled.

Another feature: The working point is bent at such angle as to just lift the serrated under surface from the tooth when the push stroke is used; but when pressure is applied against the root on the pull stroke, the serrations engage the deposits, and crushing of them occurs.

I have purposely avoided complicated bends or angles, or corkscrew effects, endeavoring to keep the instruments as simple as possible, with the blades always in line with the handle; thus, when the point of the instrument is obscure, the shank projecting from the gum line indicates the position of the blade on the root.

Embodying so many features, the instrument is almost all that could be desired.

Those manufactured, and which are known to us as the push and pull variety, were the most efficient, but their use is limited.

Recognizing the principle of push and pull, Dr. Carr devised his set of 150 instruments, every one of which has the right angle bend, making it of that type. Dr. Buckley's, shown last year, are similar. The fact of that right angle bend makes them too massive at the point to reach the deposits at the base of the deeper pockets. Existing alveolar tissue often precludes their use.

I found that a chisel shaped instrument, with the blade offset just a trifle, and the shank of the instrument bent so as to act as a rest or guide, was the ideal one for scaling, when using the push stroke, making of it, in fact, a plane. At first, to plane the surface of the root was to me the most satisfying method of procedure. Incidentally, it was found that the reaction from the planing movement could be utilized, which was done by pyramidal file-cutting the under side of the blade—in that way getting the pull action. The introduction of that feature increased the efficiency marvelously, and in another way, for it made it possible to break down stubborn calicular adhesions in awkward situations, by moving the instrument obliquely and laterally over the surface of the root—the saw-like or serrated chisel form makes that possible.

After removal of the heavy deposits, as a general thing, the surgical treatment of the roots of teeth should be carried on with so much care that little pain need be caused. The less destruction

of vital tissue, and the less inflammation caused, the more readily will the reparative process be secured.

I prefer to operate without an obtundent, because of the physical sign the patient can give when the base of a calcic recess is reached. However, there are instances when surgical treatment means something more than removing calcic adhesions. It includes smoothing the surfaces under the gum to the gingival attachment, as well as the polishing of such surfaces that can be reached with engine bits, porte polishers, cloth, tape and charged silk, first with fine pumice and finally with precipitated chalk.

Reconstructive granular tissue following pyogenic exfoliations (in fact, pyogenic tissue is but granular tissue in a state of disease) is extremely vascular and delicate, and should be given every opportunity to do its best. Understanding this physiological fact, all root surfaces should be prepared for it. The more polished the root subgingivally the more perfect the healing.

All instrumented surfaces should be left as smooth as possible, for the reconstruction and re-attachment of tissue, granular tissue being extremely sensitive. I have had some difficulty, as all operators admit they also have had, in accomplishing this; but believe I have solved that problem. I use an auxiliary set of instruments made on exactly the lines of those I have shown, but with no serrations, all surfaces being smooth. They are used as burnishers, and also to carry medicaments, following the scaling of the surfaces. With them I expect even greater results from my labors.

Up to the present time, I have been taxed in efforts to gain smooth surfaces in the deeper recesses; but the common sense of having burnisher instruments of the same shapes so as to insure finishing all surfaces operated on, is apparent. The wonder is that it has not been done before.

The use of instruments for scaling in deeper pockets should be proceeded with as though one were exploring for locations of inequalities of the root. The sense of touch is the only guide when the point of the instrument is hidden.

I wish to place great stress on this. Although the chisel-shaped end is very effective in removing adhesions, it must be done with care. But to facilitate that acuteness of touch, it was necessary to make the instrument as delicate at the tip as it is

possible to have it. Having located the deposits, my procedure is to lift the instrument until it rests on them, and then put pressure on the instrument, which breaks down the adhesions by a pull stroke and a crushing process.

The delicacy of this instrument can be appreciated only when one reaches the attachment of the peridental membrane with the root and alveolus. Instrumentation there is the crux of the operation. To be able to get the point of an instrument on or beyond the adhesions at this situation has been the desire and the dream of all operators.

It will be found that this instrument will take up the work where others fail and carry it to a cure.

The President—This presentation by Dr. Leroy, short and practical, is now open for discussion.

Dr. Eames, of Boston—The instruments which Dr. Leroy has shown to-night seem to possess merits which I have not seen in other instruments, and as a whole must be admirably adapted for use in all the situations we are called upon to treat. I say this because I am convinced that it is not necessary to use one hundred or more instruments to reach all parts. The particular shapes in these instruments which appeal to me, are those which admit of the pushing movement for the removal of those very hard serumal deposits which are often located near the apex of the root.

My own preference for an instrument is for one shaped like a scythe, which will find some sprigs of grass in a sparse locality. This kind of an instrument, in some degree, makes up for my lack of dexterity and sensitiveness to touch, and with it I am able to detect minute particles of deposit. When I once find it, if it is not possible for me to remove it with one of the four sides of the instrument, I use the point. In a few cases I have tried a bur in the engine, a bur adapted for the purpose, and under anaesthesia I have burred out thoroughly around a portion of the root in very stubborn cases. This has been partially successful. I have tried all sorts of solvents for this trouble, including Dr. Head's preparation, but I do not feel that I have gained very much by their use. A thorough surgical operation, removing foreign tissue and particles, renders solvents unnecessary. In one exceptional

case, a section of the gum over the root was removed, with a successful result.

Dr. McNaughton—Will Dr. Eames tell us about the section he cut out—was it at the margin?

Dr. Eames—The incisions, beginning at a certain point over the tooth root and diverging, more or less, were carried to the margin of the gum.

Dr. McNaughton—Dr. Eames made one cut?

Dr. Eames—Two cuts, extending it to the margin, widening the space between the cuts to include the diseased portion. Practically it has solved the difficulty in a patient who was unstable, and did not come in as I wished. I know that many practitioners do not undertake such cases; they dismiss the patient; but I did not wish to do so in this case.

Dr. W. B. Dunning—Does Dr. Leroy sometimes round the corner in the chisel edge? If not, does he not find the sharp corner is apt to scratch the root? The first thing I should do would be to round the angles slightly.

The small blades of these instruments would make them, I should think, not easily controlled in deep pockets. I have used somewhat similar instruments, and have felt somewhat lost as to the position of the cutting edge upon the root.

Dr. McNaughton—A few years ago Dr. Spencer M. Nash gave me a small bur for the purpose of condensing gold. I never used it much for that, but when a straight instrument can be used, it is one of the best instruments for removing tartar that I have ever seen. It is a long, bud-shaped bur in size equal to No. 1 (diameter .03 inch, length .09 inch), has six blades, very slightly spiral.

Dr. Leroy—I would say, in answer to Dr. Dunning, that the idea of having the straight shanks, is particularly to overcome the feature of the blade getting away from the line of the root. The blade has been kept in a straight line with the handle to overcome that feature. Pockets sometimes are so small, that even that blade is not too small. As to the bevelling of the angles, I think nearly all of these instruments have been run over the Arkansas stone, and the corners taken off.

As to Dr. Eames' practice of cutting out a section of the gum. That has been spoken of many times by operators. I have

tried in some instances to do it. There are occasions where to do that might seem permissible. It would be in such cases as would permit of the impacting of food in peculiar gingival pockets. There I would consider it advisable. If after instrumentation food is still retained, it is almost impossible to heal them, and the trouble continues.

Where a tooth is sufficiently loose in its socket to be easily rotated with the fingers, it is too loose for any service; unless that root could be valuable for splinting, I would prefer to extract. There are some instances where we can retain such teeth and have not perfect but fair constriction of the gum take place; it is safe to say that where there is any mobility, it affects the gingivae to such a degree that macerated food particles are drawn in by capillarity and the chance of recurrence of trouble is great.

Where I find it necessary to resort to immediate splinting I use the Angle regulating bands to make attachments to alternate teeth and heavy half-round wire from one band to the other, or a combination of the Angle and Jackson crib appliances, joining them and cementing them into place. I find teeth can be held firmly by such means. A more permanent appliance can be made subsequently if desired.

The President—We are indebted to Dr. Leroy for bringing to us this instructive subject. These instruments, and these ideas, are not those of a theorist, but are born of the results of a successful private practice.

Attention may be called to the fact that Dr. Dawbarn, our essayist this evening, has favored us by coming here on very short notice—not that it is at all difficult for him to do so, but it is no less a favor to us.

We will now listen to “A Number of Interesting Devices in Surgery,” by a well-known member of this Society, Professor R. H. M. Dawbarn.

DISCUSSION OF DR. DAWBARN'S ADDRESS.

The President—The discussion upon this valuable address of Dr. Dawbarn will be opened by Henry Janeway, M. D.

Dr. Henry Janeway—I wish to express my indebtedness to the Institute for both the pleasure and instruction which I have received from Dr. Dawbarn's address and the honor of addressing

you, though I have some hesitation in doing so, because I did not know what Dr. Dawbarn was going to talk about. Many of the things Dr. Dawbarn has shown to-night I have seen in actual use, and have been particularly impressed with the device he has shown for uniting fractures—the aluminum splints. I witnessed the operation he referred to, and can only state that the peg of aluminum certainly brought the two fragments of the femur in perfect apposition, rapidly and neatly.

The field of oral surgery has interested me particularly. One friend who has been very kind to me, Dr. William Carr, has referred to me a number of patients with oral affections.

One subject which is common to both the oral surgeon and the general surgeon is anaesthesia, and one method by which this can be given to advantage in oral surgery is a necessity in another form of surgery to the development of which Dr. Green and I have lately given much consideration. You are probably familiar with the Sauerbruch chamber. He devised an operating chamber from which he exhausted the air. The patient's head is outside this chamber, and the body inside. The thorax can be operated on without collapse, and extensive operations within it are possible.

Brauer then devised another cabinet in which the conditions are reversed and the head is placed inside. The air pressure is raised from three to ten millimeters. The body is in the main operating room with normal atmospheric pressure. The anaesthetist gives the anaesthetic by means of holes in the back of the cabinet, and observes the patient's face by means of a glass.

This process of giving anaesthesia should be called a method anaesthetization by means of differential pressure.

Wolhart conceived the method of inserting a tube through the trachea, and giving a continuous stream of oxygen. In this way he was able to keep rabbits alive long enough for any operation of the thorax.

Robinson, of Boston, tried these same experiments, and also Cohen, of Cincinnati, with air instead of oxygen.

Melzer deserves the credit of exploiting this method of anaesthesia which, it seems, was first suggested to him by these investigators. By the Melzer method, there is introduced into the trachea a continuous stream of air. It really is not a con-

tinuous inflation, however. The essential feature of it is that the current of air is interrupted so many times a minute, varying from six to ten times—by suddenly opening a valve and allowing all the air to escape. By this means patients are able to be kept under ether and be anaesthetized for an indefinite time.

I have been particularly interested in this method in connection with oral surgery. It seems to me it offers great advantages to the oral surgeon. I have only tried it on a few cases in the human being, but Dr. Green and I have tried it on animals in connection with our work in the research laboratory of the College of Physicians and Surgeons. Among the human beings upon whom we have used this method one patient in particular required the amputation of practically the entire nose for epithelioma. We passed the tube into the trachea, and gave the ether, with a constant stream of air. The patient was a gentleman over seventy. The operation was a rather prolonged one. We secured the flap from the cheeks, and we obtained a fairly good nose. He bore the operation very well.

The advantages of such a method of anaesthesia are several. The tube as passed through the trachea is out of the way of the operator. It can be made as long as desirable. There is no interference between the operator and the anaesthetist. Secondly, the continuous current of air emerging from the tube blows away the mucus and blood and the froth which might otherwise be inhaled. There is no danger of the tongue dropping back. The anaesthetist does not have to be very near the patient. He can take a position over the chest, and feel the respiration and the heart, and be entirely out of the way.

We had one unfortunate case. This was an old gentleman who had a very extensive epithelioma of the lower lip. The incisions for its removal had to be beyond the corners of the mouth. This operation also required the resection of half of the lower jaw, because the epithelioma was adherent to the jaw bone. During this anaesthetization, the man whom we had engaged to give ether had to leave during the middle of the operation, and turned over his work to one of the assistants. By error this man, who was not so familiar with the work, allowed the current of air to stop, and at that time we are quite certain more or less mucus was inhaled. In such cases the mucus is very foul, and undoubt-

edly this patient inhaled more or less, and the pneumonia which he developed we attribute to this cause.

I think this will appeal to you on account of your familiarity with nitrous oxide. Nitrous oxide should be used more than it is. It could be used for any length of time in this manner. There would be less shock and irritation than usually results from ether vapor or chloroform vapor.

When this tube is used, the patient's head does not have to be depressed in order to prevent the flow of blood into the trachea. It can be elevated. We operated on a dog and filled the dog's mouth with a suspension of charcoal in water, and with the animal's mouth so filled with the charcoal water, none was inhaled into the trachea.

Another device which is very useful, and it suggests itself to me on account of having used these various methods of differential pressure—is the employment of negative pressure on the head and body.

The air pressure forces considerable blood from the head into the body, and prevents hemorrhage in operations on the mouth and the neck, which would otherwise occur. Sauerbruch deserves credit for this idea.

I thank you for your kindness in allowing me to be present and take part in this discussion.

Dr. Nathan W. Green—I felt much privileged to have heard Dr. Dawbarn's discourse. As one article and another of surgical interest was brought out I was struck with its clearness. Dr. Dawbarn certainly has the key to the situation. I would like to speak of his spinal needle, which I consider especially good—the blunt point preventing cutting and taking any tissue into the spinal canal. The whole thing is very well designed for the purpose for which it is used.

Among surgical procedures I would like to speak of one thing Dr. Dawbarn has done, which I have used. It is not an appliance, but a method—the method of sequestration—anaemia where there is liable to be much hemorrhage. The blood is corded off in the limbs of the patient by placing around each limb a towel and then a strong elastic band, which is clamped and which does not obstruct the arterial flow, but prevents the return flow. The blood is pumped into the limbs by the heart, and is held in

the venous tree, and a large amount is thus sequestered in each limb. If it is a naturally bloody operation, it becomes by this means much less so, and each limb may be looked upon as a reservoir for a natural venous infusion in operations on the head, neck and trunk. I think that is one of the most important things Dr. Dawbarn has done.

In looking over some subjects for this evening, I have run across an article by Dr. Matas in which he speaks of a procedure by Moszkowicz, of Vienna. It is based upon the fact that if the vessels of a limb are compressed by an elastic bandage for anywhere from 18 seconds to 5 minutes, on taking off the bandage, there will be a blush of pink following down as the bandage is removed. Moszkowicz experimented with colored fluid on the cadaver. He found the pigmentation coming only a few centimeters below the constriction of the vessel. He gathered from that that the lower border of the pink coloration was the point where the forceps (in his experiments) or the embolus occluded the large vessel, and he concluded one could operate with successful result at that level.

Matas has found upon waiting a blush comes 10 or 15 minutes later, that extends half way down the leg, and he thinks this an important sign in determining the lowest point of circulation before undertaking an operation for any condition arising from occlusion of the main artery of the limb.

Dr. Janeway has mentioned the work we have been interested in trying to develop—the technique of chest surgery. We have tried intra-tracheal anaesthesia. We recommend it when indicated. We have also used an over-pressure cabinet, which we think is of service. Normally when one side of the chest is opened the patient goes on breathing with the other side, but in little people, where the mediastinum is moveable it is very important to keep the pressure in the lungs up to seven millimeters of mercury. Without this opening one side of the chest, in dogs, means practical collapse in both lungs. In children also it means collapse of both unless adhesions are present. We think this cabinet is specially of value for chest surgery in children, where the trouble is often due to empyema, and we think better results will be obtained through its employment.

I am indebted to you, Mr. President, and to your committee, for the privilege of being here to-night.

Dr. Dawbarn—When I asked Dr. Janeway and Dr. Green to be so kind as to be present and open the discussion, I did it because I recognize in them the kind of surgeons who are making for themselves national reputations for original work. That is the one kind worth having. The only reason why an institution like Johns Hopkins has acquired its reputation has been on account of its original work. These men have been doing as good original work as any I know in the profession.

I agree with Dr. Janeway as to the value of Dr. Melzer's work. In my Gross prize book I spoke against the rule of advising after an operation for removal of the tongue for cancer that the patient be allowed to sit up the next day, if possible.

The saliva runs down the trachea, in that posture at first; and the commonest cause of death then is a "swallowing pneumonia," as the Germans call it. I have advocated putting a patient during the operation for extreme cancer of the tongue with the head a little lower than the trunk, so fluids from the mouth cannot run into the respiratory organs, and keeping them in that position for—if need be—weeks afterwards—the test as to when they may safely sit up being, after they have gargled, to endeavor (sitting up) to swallow a mouthful of ice water. If they can do that without coughing, due to the cold water running down the larynx, it shows they have regained control of the epiglottis; if not, the chances are they will have septic pneumonia, which will carry them off, if they insist on the upright position.

I have to thank Dr. Green for calling to my attention the point he names in regard to Matas' work on extremities. It is new to me.

The President—This address of Dr. Dawbarn's is considerably out of the ordinary, containing things new to most of us. We are very grateful to him for it, and we are also indebted to Drs. Janeway and Green for their service to us.

Adjournment.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening February 7th, 1911, at the Academy of Medicine, New York City.

The President, Dr. S. E. Davenport, occupied the chair and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

The President—Gentlemen, our Society has been visited by death many times during the past year. Since last June three of our charter members have passed away, and since our last regular meeting an active and prominent member—Dr. George S. Allan—died. I have asked Dr. Charles O. Kimball to prepare a minute upon the life and work of Dr. Allan, which Dr. Kimball will now read.

Dr. C. O. Kimball—Five years ago last evening we met under the shadow of a great loss in the death of our beloved Vice-President, Dr. Charles F. Allan, of Newburgh, and it fell to the lot of the same one to whom you are listening this evening to speak of the beauty of the life we had known and of our gain in loss. Once more our narrowing circle has been entered and another life full of faithfulness and cheer is ended. Yet as we were reminded then, there is an immortality in friendship and something of uplift remains to enrich the lives of those who travel the road a little longer.

George Smith Allan, the son of an artist, was born at Detroit, June 14th, 1837. Afterward his parents moved to Cleveland, Ohio, where in 1844 his brother Charles was born. The boys were educated in the public school and high school of Cleveland and grew up in its life to maturity. George entered Kenyon College, Gambier, Ohio, and graduated in June, 1859. Two years later, in 1861, he graduated from the Ohio Dental College in Cincinnati, and, taking a course in the Pennsylvania Dental College, began practice in Newburgh, N. Y., in 1862. In 1869, leaving this practice to his brother, he opened an office in New York. Here he remained faithful to his work and to his patients, to the very end of his life.

He married, in 1867, Eunice Ruth, daughter of Prof. Charles

Davies, of Fishkill, and to them nine children were born, three dying in infancy. His wife, four sons and a daughter survive him. He died at Montclair on Sunday, January 15, 1911, while peacefully talking with a sick friend to whom he had gone to bring sympathy.

He was much interested in microscopy and for two years (1874-1875) was Professor of Histology in the New York Homœopathic Medical College. He was a member of the Alpha Delta Phi Society, of the Sons of the American Revolution, of the University Club of New York and of several Dental Societies, among which was the New York Institute of Stomatology, of which he was one of the founders and one of its earliest and most honored Presidents. To this society during the last sixteen years of his life he gave unceasing and devoted service. And if it has been able to achieve anything in the cause of good dentistry it is due in no small degree to the wise, faithful and unwearied efforts of Dr. Allan.

Let me now examine this life, whose brief story we have rehearsed to see what it has for us to admire and follow, what characteristics run through it, giving it form and color.

The dominant thing, the unifying purpose of his life which was ever with him, and to which he gave freely and unsparingly by day and by night of time and thought, of care and steady, persistent work, was his chosen profession; which he served with an intense concentration of energy that was impressive. He had few hobbies to relieve the daily strain. When others sought relief in various ways he found it in a renewed devotion to his work till it became the very warp and woof of his life; though through the fabric we can trace some of the threads that gave it color.

One of these threads, a silver strand running through the whole texture and lighting up its sombre hue, was a willing and ready spirit. Was there anything to be done, difficult or troublesome, "Here am I, send me," was his constant word. This perhaps was his most striking characteristic. Again and again it was "Call on me"—for money, time, service, anything that would help raise the standard of his profession to a higher point. Withal, he was modest, putting forward his most sagacious views with due allowance for the opinions of others.

There was also the blue thread of an eager, inquiring mind,

seeking for new truths or new applications of old ones, but always in the interest of the work he loved.

Shining through it all was the golden thread of a big, loving heart, with a cheerful look and a brave, kind spirit ready to condone the errors of others, for he had felt the bitterness of sorrow and from it had learned its lesson.

These are some of the strands of which his daily life was woven and his life was a success, for by faithfulness in his work he won the respect, confidence and friendship of those he served so well and the love of his friends.

We, too, are facing forward and each one who drops from the ranks leaves us nearer to the front; so let us raise our heads and face our daily task with a bright, cheerful purpose and an unflagging zeal, that when the summons comes we may, "sustained and soothed by an unfaltering trust, approach our grave like one that wraps the drapery of his couch about him and lies down to pleasant dreams."

The President—This is a beautiful tribute paid to our departed friend, but none too great for the man he was. Dr. Allan was known intimately by but few of us, but those whose privilege it was to come close to him, found him a very loving and lovable character. We are under obligations to Dr. Kimball for the time and thought he has given to this memorial expression. It will appear in full in our minutes, and a copy will be sent to Dr. Allan's family.

We have something of an entertainment mapped out by the Executive Committee this evening. It has been decided to pass the communications on theory and practice for to-night, and begin upon the real pleasure of the evening at once.

Our essayist feels at home in New York City, but he is a thorough New England gentleman who has been president of almost everything in that section that has a professional function, and we are fortunate to secure his attendance.

Dr. Ned A. Stanley, of New Bedford, is connected with Harvard University Dental Department. He has been an instructor in the operative department there for a number of years, and practically has charge of the teaching of the treatment of pyorrhea. Having special facilities for knowing about the popularity of the instructors in that school, I do not mind saying that

Dr. Stanley is a very popular instructor with the boys there and it is quite probable that he will make a hit with us.

The title of his paper is "The Treatment of Pyorrhea by Instrumentation." I have the pleasure of introducing Dr. Stanley, of New Bedford, Mass.

Dr. Stanley—Mr. President and Fellow Members—I hardly know what to say after such an auspicious introduction. I bought a new hat, two or three days ago, and remarked to Mrs. Stanley that I thought it did not fit very well. She said: "Perhaps after you have been to New York your head will swell, and it will fit you all right." I said I thought likely the hat would come down over my ears then. As your President introduced me I felt the hat resting on my shoulders!

Your President also said "entertainment," but when this vital question is on the gridiron, and all of us get a bit of it, some may get a morsel that will help him, and I hope all of us will get some good from it.

(For Dr. Stanley's paper see page 120.)

Dr. Stanley—A lady consulted me, and on nearly every tooth in her head there had been extensive receding of the gums, principally on the labial and buccal surfaces. The cuspids seemed to have been denuded nearly a quarter of an inch. She was about 28 years old, the mother of three children. She had a beautiful set of teeth, and naturally was much exercised over the condition of the gums. I planed the surfaces of the teeth, being particular to remove the affected portion of the membrane. If this can be accomplished the parts will return to a healthy condition, and probably the receding will cease. I did not see the lady for some time, and when I saw the supposed case a funny coincidence happened. I examined the mouth and my heart went down. I said: "Here is a failure; the gums look worse than they did before." I was puzzled, and did not know what to think. Then I discovered it was a sister of the patient treated. She had made an appointment and they resembled each other so closely that I did not detect the difference at first. In the case treated, however, the gums have stopped receding, and her mouth looks better, and I think I have succeeded.

There is a little poem of Kipling's that I am very fond of called "The Palace," and shows how much we are indebted to

the man who has gone before. By your permission I will quote it: (Dr. Stanley quoted the poem.)

I have always felt that one reason why so much had been said and written about the systematic treatment of pyorrhea was because thorough instrumentation had never been done. We have never had a case of instruments with which perfect work could be accomplished and the results obtained. Here are one hundred and fifty instruments. They look appalling and baffling at first sight, but there are really three sets. Nos. 1, 51 and 101 would be the same, only in a different size. They are divided into groups, or families, which are lettered, and there are eight instruments in each family numbered from 1 to 8. No. 1 is made for the mesial surface; No. 2 the bucco-mesial corner; No. 3 the buccal surface, and so on, an instrument for each surface. Understanding one group gives the key for the whole, and after obtaining control, it is an easy matter to know which instrument to reach for. It is the most comprehensive set I have ever seen for this purpose. No one man has produced them, but several different men with ideas have contributed to their present state of completeness.

To put the thing in a nutshell: Having the proper instruments, know that the work is done as it should be and very little medication is required. Later it may be helpful to use any form of phenol, or the different forms of iodine. Physicians are using iodine more than they have been doing, and I am a great believer in it, but our first duty is thorough instrumentation.

The President—Dr. Stanley invites all to inspect these instruments after adjournment. Dr. Stanley has the ability of saying a great deal in a few words. This is a very concise and valuable paper, the discussion of which will be opened by Dr. Gillett.

DISCUSSION OF DR. STANLEY'S PAPER.

Dr. Henry W. Gillett—As the President has said, Dr. Stanley has the capacity of saying much in a few words. In this instance he has said little that I can disagree with; so I am rather at a loss for subject matter. It is known to all present that my Pyorrhea work is done with instruments of the type Dr. Stanley has shown. Up to the time of the introduction of this type of instrument, we heard little or nothing about smoothness of the surface of the root itself as a factor in Pyorrhea treatment. Since

that time several different practitioners have advocated efforts in that direction.

I do not desire to appropriate Dr. Leroy's material, since he is to speak later, but hope he will speak more at length as to the results of his efforts at burnishing root surfaces after scaling. I wish he might show us root surfaces that had been so treated and then subjected to the macerating influence of Pyorrhea pockets. It has occurred to me that a smoothing of the root surface may be one of the effects of the use of concentrated mineral acids in Pyorrhea pockets as advocated by Dr. A. J. McDonagh in his paper before this Society. I have had the same thought concerning Dr. Head's preparation.

I think it is now generally admitted that a smooth as well as a clean root surface is of importance in Pyorrhea treatment. After several years' experience I still adhere to the statement previously made to this Society—that I have found nothing that in my hands leaves so satisfactory a root surface as instruments made and used according to the principles applied in this set of instruments. In my hands they are not only more effective in producing the desired results, but I get the results more speedily than with anything else I have tried.

In saying this I realize that the personal equation is introduced, and it is important that each operator use such instruments as enable him to most successfully attain his end. I think the day has passed when men of experience and earnestness take the ground that Pyorrhea is incurable, and it behooves all of us to find some class of instrument with which we can treat Pyorrhea successfully.

I agree with the essayist that efficient instrumentation is the foundation of success in this work, and I use even less local medication than he advocates.

I am still looking forward hopefully to the time when we may be able to prevent, by systematic medication, the excessive deposits of sordes presented by some subjects. A recent paper by Dr. LeRoy, of Athens, Ohio, is suggestive in that line.

In the type of case which Dr. Stanley has mentioned as Dry Pyorrhea, for which I prefer the term "Atrophy," I have found no other treatment so effective as just what he described to us in the way of instrumentation.

Our great disgrace in the line of Pyorrhea is that as a profession we have not prevented more Pyorrhea instead of finding it necessary to cure it. As a profession we have not done anything like our whole duty in that line. We do not begin early enough—our eyes are not open to the beginnings of Pyorrhea, and it is just in these beginnings that these instruments are so effective. I find them effective in all stages of Pyorrhea, but particularly so in those earlier stages. It is just at that time that critical observation and prompt work are necessary, with some method of instrumentation that each individual finds effective, and it is there we should concentrate our attention.

Dr. W. D. Tracy—Dr. Gillett suggests that we do not open our eyes early enough, or do not get up early enough to find out what to do with pyorrhea. Some of us rise at 6.30 and get to the chair at eight, and I am wondering at what time we should rise to find out these things.

This is a practical paper from a practical man. When an essayist begins to theorize and indulges in flights of the imagination one can often find something to criticise and something, perhaps, upon which to elaborate; but Dr. Stanley presents nothing but facts.

One interesting thought in connection with this subject is that when I came to New York City fifteen years ago there were, so far as I knew at that time, only two or three men who claimed to cure pyorrhea alveolaris, and the rest of the profession looked upon these men as “cranks” and laughed up their sleeves at them because of their claims.

Nowadays, however, there are in every city a large number of men who not only claim to cure pyorrhea, but who, I believe, do cure it. So, perhaps these men of fifteen and more years ago were not so fanatical as we thought and possibly they did effect cures that the average practitioner was unable to obtain.

I understood Dr. Stanley to say that instrumentation was the only treatment that would cure pyorrhea. I think we all agree that there is no cure for pyorrhea without instrumentation, and that medical treatment, local or systemic, is simply accessory to the cure when perfect instrumentation has been achieved. As Dr. Gillett says, that may be done in more than one way, or with more than one set of instruments. If a man can do the work

better with one set than another, that is the set for him to use. In speaking to Dr. Hutchinson only a few days ago, he remarked that he felt he could do the work with his own scalers not only better, but quicker than with any he had tried, and he made the criticism about this set of instruments shown by Dr. Stanley that perhaps they were a little too cumbersome—too many in number; but that is his personal experience.

In the study of pyorrhea, we have to look at the general oral condition, and the condition of the membranes. The term "pyorrhea" seems to be very much confused in the minds of many. I know it has been in mine. One man thinks of one thing as pyorrhea, and another man thinks of something entirely different. If I took exception to anything Dr. Stanley said, it would be to the term "dry pyorrhea" and I think the term should not be used in dental literature. I never saw such a case. Pyorrhea means to me a breaking down of the gum tissue and also of the peridental membrane, and the establishment of a pocket; but a simple recession of the gum—what Dr. Gillett calls atrophy of the gum—would not come under the head of pyorrhea.

Dr. Stanley—What causes the gum to recede?

Dr. Tracy—I presume the breaking down of the peridental membrane; but it has not gotten to the pus condition.

Dr. Stanley—There must be pus there, although a microscope might be needed to show it.

Dr. Tracy—Dr. Stanley also spoke of a case of toothache, which he felt came from a pyorrheal condition. Such a thing might be possible, but I never saw it. It occurred to me that that case of toothache might have come from peridental abscess and when Dr. Stanley treated for the pyorrheal condition, as he thought, he ventilated that abscess and gave relief.

When recession of the gums is present and shows noticable progress without microscopic evidence of pus, I have proved to my own satisfaction that by proper planing and polishing of the tooth surfaces underlying the free margin of the gums that the recession can be retarded and in many cases practically controlled.

It is my opinion that recession of the gums (where no disease is present) is one of the many physiological changes that take place with the flight of time. As the so-called "crows' feet" occur at the outer angle of the eye, as the hair turns gray and as the

human figure itself changes form with the passage of years, so will the gums recede. The recession which interests us most, however, is of a pathological nature, and it is the rapid and destructive tendency which we seek to control.

Uncleanly mouth conditions I believe are the predisposing cause of pyorrhea. One theory is that pyorrhea is induced by malnutrition and auto-intoxication. I believe pyorrhea may be brought about by more than one cause, and it is possible that if the vitality of the patient is depleted, and the tissues are in a condition of reduced vitality, that they succumb to the influences of the unclean mouth conditions and there is where the pyorrhea begins. A patient may be in a very bad physical condition and may show many symptoms of auto-intoxication and still present no signs of pyorrhea. If such a patient is systematic and intelligent in his care of the mouth and teeth and receives periodical prophylactic treatment at the hands of a competent dentist, it is quite possible to protect that individual from the attack of pyorrhea which would surely occur if the details mentioned should be neglected.

Considerable difference of opinion seems to exist regarding the serumal deposits upon the surfaces of the teeth. My personal conviction is that the serumal deposits follow the congestion of the gum and the more chronic the congestion of the soft tissue the more noticable will the deposits become.

I do not believe we have pus until there has been a breaking down of the tissue and absorption of the process, and a pocket is formed that cannot be cleaned by the patient. Whatever departure there may be from the normal conditions, prior to this stage, the case is not to be classed as pyorrhea until the conditions described have occurred.

Then again comes the question of cure. Some men say they have cured a case, and in their own minds they feel they have; but in the minds of other students of the subject, it may not be a cure; yet both men are sincere. A cure does not mean restoring the lost bony process, or the peridental membrane; but it means the obliteration of the causes that brought about the thing—obliteration of the pocket. The treatment should be such as to cause that gum tissue to shrink back and become firm and wholesome.

The patient asks if the gum can be made to come down. We

must admit it cannot; but it is possible to stop the progress of the disease. That is about all I have achieved, except in some instances one does seem to observe a downward growth of the gum, and sometimes we do seem to get a proliferation of bony tissue. That does not take place, however, where things are badly balanced, and the dental arches are broken up. We are more liable to get a wholesome condition of the bony tissues, as well as the soft tissues when all the teeth are in place.

Occlusion is a large factor in the cure of these troubles. We cannot afford to overlook the relation of teeth on the same arch to each other, or the relation of the superior arch to the inferior. We must study the occlusion and its variations from the normal in treating pyorrhea as well as in every other branch of dentistry.

I am not prepared to state that pyorrhea is simply a local trouble, because I believe systematic conditions have their bearing on mouth troubles, and I believe men who are treating pyorrhea as a local trouble only are perhaps not taking the widest view of it; so we must get together and give one another what we know about these subjects.

The President—Our essayist, and the two gentlemen who have discussed his paper, are all general practitioners, who look upon the proper treatment of pyorrhea as being merely a fulfillment of one of their various duties to patients.

The next gentleman to discuss the paper is a specialist, who for a number of years gave his attention also to general practice. Finding himself specially interested in the treatment of pyorrhea, he finally decided to give his entire attention to the treatment of this disease. We will now listen to Dr. R. G. Hutchinson, Jr. Dr. Hutchinson thought it might be possible for him to present a patient this evening.

Dr. R. G. Hutchinson, Jr.—It gives me more than the usual amount of pleasure and satisfaction to be here this evening, especially as I am in absolute harmony with the essayist and the two previous speakers. I fail to see how any practical man can reach any other conclusions than those cited this evening. When I read the copy of Dr. Stanley's paper, and as is my custom, read it to my wife, she said: "If I did not know you had not written that paper, I should consider it was yours—it so exactly coincides with your views."

In regard to the case I intended to show tonight, I regret the patient was unable to be here. Perhaps it would be well for me to give a history of that case, as it is rather a remarkable one. The patient was referred to me by a fellow practitioner, who had had him under treatment, giving frequent prophylactic treatments with very unsatisfactory results—his claim being that pyorrhea could not be cured, as there was a constant recurrence of the trouble. I disagreed with him, and he said he would send me the case, and see what I could do with it. The patient's mouth was affected throughout, extensively. Both the gum and the process had been lost to a considerable extent, involving perhaps one-quarter of the entire length of the root from gingival margin to apex. There was a profuse discharge of pus from nearly all of the sockets. Many of the teeth were lost and four others were so badly septic, that I extracted them at once. One of these turned out later to have been the cause of an abscess of the antrum which did not manifest itself until the treatment of the pyorrhea had been concluded.

On the left side, some of the teeth were already devitalized, and one of them had a crown on it. The lower molars had lost their support below the roots. Altogether, it was a very aggravated case.

April 6, 1909, the treatment was commenced, the four teeth extracted, and some of the remaining teeth scaled.

April 7th, more of the teeth were scaled, and on the 8th the balance of the teeth. There were twenty-five teeth remaining in the mouth. This was not a thorough curettment. In aggravated cases, I do not believe it is advisable to attempt a curettment at one sitting. A healing is accomplished much more readily if we do not over-irritate the parts, and so it is my custom to scale as thoroughly as possible, without undue injury, and then go over the ground more thoroughly afterwards.

On April 12th the whole mouth was treated again by instrumentation, and April 14th the teeth were polished. That was within eight days. After the completion of the treatment, the patient was instructed to report to the dentist referring the case for examination. The sockets from which the teeth had been extracted, had filled with granulation tissue, but when the case was referred back to the dentist, he found a slight soreness about the

socket of the upper first molar, which had been extracted. He instructed the patient to come back to me, and I found a puss pocket, and on opening and exploring, penetrated very freely into the antrum. There had been a chronic abscess of the antrum which had not manifested itself until then. That condition I referred to an oral surgeon for treatment as I did not feel competent to undertake it. It is still under treatment. The rather remarkable and unusual part of this is not the restoration to health, for that is to be expected, but the subsequent freedom from salivary calculus as will be explained in detail. By the way, those gums, at the time the polishing was done, had resumed their normal appearance. The discharge of pus had absolutely stopped, contraction had taken place, the teeth were perceptibly tighter and subsequently became absolutely rigid—we must allow time for the restoration of tone and rigidity—and everything was clean and healthy.

The patient reported at monthly intervals for examination, from April to October. During that time there was no need of even a prophylactic treatment. He was about to leave for a six-months' trip to Europe, and though there was nothing on the teeth except tobacco stain, I did not deem it advisable for him to go away for six months without prophylactic treatment, so I polished the teeth again.

In April, 1910, I again polished them, as he expected to be gone for quite a while.

He came to my office a week or two ago, and there was absolutely no recurrence. The gum looked like the pink wax we use. There has been no recurrence of suppuration or any pathological condition whatever, and there never has been an instrument touched to the teeth except to remove tobacco stain. Nothing has been done since last April, and I hoped to exhibit the patient tonight.

This is an unusual case. Usually we find some recurrent salivary calculus, which is not connected with pyorrhea, in my opinion. This is a case which had baffled the man who sent it on account of the constant recurrence of those deposits, but since the original polishing of those teeth, there has been none.

An interesting incident in connection with this case is the fact that for about two years prior to the cure of the pyorrhea the

patient suffered almost constantly from carbuncles. Since the cure of the pyorrhea there have been no carbuncles.

Dr. Black recently stated, at the Second District Society, what I have believed for some time to be the fact, that salivary calculus is formed by the calcification of a bacterial coating. If we keep the bacterial coating off the teeth, the salivary calculus cannot form. I have arrived at that conclusion through clinical observation, and Dr. Black has arrived at it through microscopical investigation.

The prevention of such deposits depends more on the care with which the patient cleans the teeth than on anything we can do. We must first re-establish normal healthy conditions, and must instruct the patients in such a way and keep them under such supervision, that they will be able to remove the food debris, and so we will prevent the formation of salivary calculus.

I hope all will bear with me a little longer in this discussion, for I feel that the paper is worthy of the greatest consideration.

Dr. Stanley has spoken of the systemic condition. I do not resort to systemic treatment, as there is no occasion for so doing. In former years, I did not attain the results I wished, because of inexperience and lack of skill, and believed that sometimes systemic treatment was advisable. If the patient is in a badly debilitated condition and needs treatment for the building up of the system, regardless of the pyorrhea, usually he is already under a physician's care, and we do not need to refer him to one.

We have no need of resorting to systemic treatment, provided our instrumentation is thorough. If there is still an exudation, it is evidence that there is something present to cause it. I have failed to remove something, either mechanical or bacterial, if there is a persistence of inflammation at one given point. If the inflammation or irritation at one point can be stopped and not another, the trouble is surely not due to a systemic cause.

Dr. Stanley says pyorrhea is curable. It is positively curable, as well as is caries. It reduces the vitality of the tissues, making them liable to the attack of the bacteria which are present. He speaks of what constitutes a cure. Of course, we cannot restore tissue; he is exactly right in that. We can, as Dr. Tracy said, stop the destructive process, and eliminate that pathological condition which is bringing about the destruction of the supporting

tissues. We restore health to those parts, and that is a cure. It is unreasonable to expect an attachment of the tissue to the denuded tooth. When the alveolar process is removed it is absurd to expect to bring about an attachment of the gum to a surface to which Nature never intended it to adhere. If the socket has been enlarged through suppuration or mechanical irritation causing loosening of the teeth, if you remove all pathological conditions, are removed and the teeth held in place to favor the establishment of new tissue, the space existing between the walls of the alveolus and the teeth will fill with healthy granulations, and I have no doubt that bone will ultimately form there. We have often seen cases where the lingual and buccal plates are intact, but the bony septum has been absorbed. There will be a certain amount of absorption of the margins and the pocket formed there will fill with granular tissue, so there sometimes will be a level floor through that pocket, the bottom of which is higher than the original level, and the sides a little lower.

Dr. Stanley has quoted from Dr. Patterson, and I admire his views immensely.

In reference to the distal surface of the second molar being a frequent point of attack: so many cases have presented, and Dr. Schamberg has shown us so many radiographs with an infiltration of the bone, that I have reached the conclusion that unless the third molar is required for some good reason, it is advisable to remove it to eliminate the pocket, which, in the majority of mouths, furnishes a breeding place for bacteria. It has practically no function, for the food will be masticated where the tongue will conveniently place it, and so it is frequently advisable to remove these teeth in order to maintain sanitation.

The matter of planing the surfaces spoken of by the essayist is one I would take exception to. Dr. Stanley says when we want to make a board smooth, we plane it. If we want to remove a part of the material of which that structure is composed, we use a plane and take off a section; but we should not do that with a tooth, unless the surface is pathological. I believe the operation results in the restoration to health more on account of removing that which is necrotic, than on account of presenting a mechanically smooth surface. We may have a corrugated surface free

from irritating points, which would be entirely compatible with the formaton of new tissue.

What has been referred to as "dry pyorrhea" is undoubtedly a necrotic condition which is causing an auto-intoxication, although there is no pus. It is a disease by which the supporting structures are lost, and that may be brought about by over-stimulation. We can carry stimulation to a point where it is constructive; beyond that it is destructive, and many cases are brought about through excessive friction in brushing. Over-stimulation in some anaemic cases will bring about a wasting of those tissues; and if the tissues are injured to that extent, there will be a progressive necrosis.

There is such an infinitesimal amount that it seems to the average practitioner impossible that its removal could bring about a cure. The bacteria are not large enough to stumble over, and I suppose it would require the use of a high power microscope to discover them.

Dr. Tracy referred to the instruments. I believe I get the best results with my own instruments; but I have no doubt those who use these instruments get better results than they would from mine. It makes comparatively little difference what instruments we use. The care of the mouth, as Dr. Stanley has said, is of the utmost importance; but I will not touch on that point to-night.

The closing sentence or paragraph of the paper is one of the best I have ever heard. The essayist said pyorrhea will never be cured by the use of selected medicaments, vaccines, systemic treatment, or by the man who does not grasp the subject with his finger-tips as well as his brain.

There is no necessity for the use of medicaments. We resort to medicaments when we do not get the results by instrumentation, and that should be *never*. The use of vaccines causes an artificial condition, which masks the symptoms. The resistance had better not be raised. It is equivalent to administering large doses of anti-pyretics in cases of fever. We do not want to reduce the temperature, because we would then find it more difficult to diagnose the cause. If we raise the opsonic index in pyorrhea with vaccines, we are baffling our own efforts.

The use of local applications I also consider not at all neces-

sary, except in a mild form. I spray out the pockets before beginning treatment, with peroxide of hydrogen, in a compressed air syringe for the mechanical removal of the soft putrefactive contents. I follow that with a mild antiseptic wash similarly applied, and repeat the process after treatment, but nothing in the way of a stimulant is used, no more than a surgeon would use a stimulant on a surgical wound. He allows Nature to form a seal with a blood clot, and he protects the parts against injury by re-infection. Although Nature has provided a great deal of immunity in the mouth, we must remember that we are constantly subjecting the wound to mechanical irritation and bacterial action. Therefore we should use a mild antiseptic solution. Further than that, I think medication is unnecessary and inadvisable, especially in view of the fact that many of our scientists in the medical and dental world now consider that antiseptics are detrimental rather than otherwise, and many use a normal salt solution only.

I would like to speak of the acid Dr. McDonough used. I believe he claimed that the acid made possible an attachment of the living tissue to the dead organic tissue in the teeth.

There are many things that cause pyorrhea, and we must diagnose them all. We must find out what caused the injury—bad fillings, malocclusion and all such things.

Any disease to which the body is heir is made possible by low resistance. If we were absolutely resistant, we could not develop pyorrhea, even in the face of the most irritating conditions; and we see, sometimes, cases where all those conditions are present; and yet there is no pyorrhea; but that does not prove that lack of resistance causes pyorrhea. It merely shows that sufficient immunity exists to prevent the establishment of the disease in spite of the fact that the causes are present.

Dr. L. C. Leroy—It has been a pleasure to listen to Dr. Stanley's paper, and the discussion, and I am glad of the opportunity of contributing to the latter.

While reading the essayist's paper, I was impressed again by the fact that the common use of the word "pyorrhea" has been a very serious handicap in the early diagnosis of this disease. It seems to have established a feeling among dentists that unless they were able to demonstrate the presence of pus about the

sockets of teeth, there could be no danger from what appeared to the superficial observer to be small amounts of calculus. They started out by disregarding those "little things."

Another serious handicap was the acceptance of the word of the few that pyorrhea was incurable. The profession has not been so much to blame in accepting this idea considering the disadvantages they labored under in the instruments then at their disposal, and the methods then in vogue.

The use of the term pyorrhea is so misleading and invites such a mental picture that unless the listeners are those who are advanced students in investigation of this malady, or specialists, they are liable to be carried away by the idea that pyogenic conditions must exist before serious complications can obtain, while in reality almost every patient of twenty-five years or more will be found to have some recess where calculus to a greater or lesser degree is lodged. It may be infinitesimally small, but if it be overlooked, it will inevitably be the foci of something more grave.

I am making a plea now for a recognition of this disease in its incipency.

Up to the present time all investigators of the cause and cure of this disease have been obliged finally to conclude that the removal of the adhesions is the *only* way in which to prepare the dental integument for restoration to health, and the removal of these adhesions is so all-important that only in proportion as we are successful in so doing do we establish cures.

Dr. Stanley has called our attention in particular to the use of instruments for the surgical treatment of the malady in question, and directed our attention to a special kind which have contributed to his successes and he expects that we comment on them.

There have always been two great weaknesses in the attempts to cure of pyorrhea. The first has been the instrument. My observation as well as experience is that the operator procures instruments and then proceeds to adapt himself to their structural peculiarities. He feels from the beginning that they are inadequate (or has it forced upon him) through most of his big undertakings—and that is where they are most vitally important. I know that most of my failures were due to my inability

to accomplish with such instruments all that the inventor claimed for them.

The second great factor is the man. Had there not been remarkably good men "behind the guns," the instruments would not have made the record they have. Had Nature failed as many times to bridge the gap as did the instruments, half of the number treated for pyorrhea would be edentulous.

There are two very important features in instrumentation. The greater of these is the necessity for removing all adhesions. It is comparatively simple for the expert to remove calculus from even the deepest pockets—all but the calculus which is in direct contact with, and which is the cause of the disease at the still existing periodental membrane attachment to tooth root.

The next most important thing is the making smooth of all surfaces which have been operated upon. By that I mean all subgingival surfaces which the cutting instruments have touched; and not that procedure which has heretofore invariably been practiced, *i. e.*, reliance upon the porte-polisher, hand polisher, rubber disks, charged silk, etc.; but the actual burnishing of all surfaces. For that purpose I use a set of instruments, exact duplicates in shape to those I use for scaling, but having all their surfaces smooth; with these I am able, after surgically treating a root, immediately to follow it with a burnisher of the same shape which I also employ to carry my medicament, etc., when such is needed. This method of systematically smoothing all surfaces of roots operated upon is original, I believe. I now consider it most essential to burnish all surfaces as described. When we consider how vascular and how extremely sensitive is granular tissue, it is no wonder that more cases have not been cured.

I have given of my best in time and study to this disease for more than twenty years, and as the fruits of my labors I have devised a set of instruments with which some present are familiar. To me they come closer to perfection than any others.

This is the feature brought out by Dr. Gillett in his remarks. It is a feature that naturally forced itself upon me. In my endeavors to overcome this disease I evolved a set of instruments which have been remarked by many as most original and unique, although very simple. They are so slender that they reach to the

bases of pyorrhetic pockets. The instruments shown by Dr. Stanley are, to my mind, too cumbersome at the point. They fail to reach the bases of the deeper pockets. They will remove, as I said a few moments ago, all but that which is in contact with the periodontal membrane. So much for instrumentation; but instruments are not all that is needed.

I have heard many say that it was malpractice to retain in the mouth affected teeth which were loose; very loose, I suppose they meant, yet I have heard those same men argue that the teeth described—nearly always incisors—were so loose that they were obliged to exert their ingenuity to retain them that they could be surgically treated, and not accidentally extracted—and they obtained cures in such cases. I am not disputing that fact, for I know that it can be done; but I do take exception to these men who advocate the extraction of teeth without good strong efforts to save them, and who condemn their fellow practitioners who, in *their* eagerness to serve humanity, resort to temporary or permanent splints while treating badly affected teeth, bicuspid and molars in particular. My policy has been to give all teeth a chance, except those which are immediately dangerous to the patient's health, through constitutional complications.

Any ordinary practitioner can do the conventional thing, for the world is filled with such operators. The reason why success does not attend ordinary effort is because that kind of effort is not sufficient to reach results which are only obtained by the most intelligent effort. The universe is governed by fixed laws.

A man proves to me that he has attained certain results. This makes me confident that I, too, may compass the same thing, providing always that I place myself in the same relationship to the same fixed principles.

When I came into dentistry the treatment of putrescent (or any other kind of pulp canals) was the all-absorbing topic. What kind of a fool would you call the man who today condemned those cases without a trial. The men who have blazed the trail throughout all eternity have been those who have had the courage of their convictions, and who, if they met an obstacle, would not see in it "no thoroughfare," but deliberately sought out the cause and devised means to gain knowledge of the forbidden ground.

Dr. Stanley quotes this from Dr. J. D. Patterson: "Any

irritant of whatever nature that interferes with the integrity of the gum margin, or is prejudicial to function, may cause pyorrhea"; and Dr. Stanley makes what he calls a logical deduction—"that pyorrhea is a contributing, if not the primary cause, rather than the expression or symptom of a constitutional disorder."

All such deductions can be set at variance if we try to trace back of the effect, the cause of salivary calculi, or any other calculi in the body. Is it normal that it should be in such quantities as is found in the saliva of those who are affected? If the preponderance of calculus is due to faulty metabolism, that condition must be the effect of some other cause, and so the chain lengthens. Quoting again from Dr. Stanley, he says: "Like Tammany, they are at work while you and I sleep; and no matter how good our intentions, or how honorable our work may be, they to frequently obtain complete control of the citadel." Why?

It cannot be because he and other practitioners have not put forth our best efforts. To me it seems that pyorrhea is one of the prices we have to pay for the luxury of civilization.

I have never seen or heard of a case of pyorrhea in a dog or cat or wild animal which lived close to Nature; but I have seen a number of cases in the over-domesticated animal. They pay this price for domestication.

To sum it up in a nutshell, that is the cause of the trouble in the human family; but I am discussing the essayist's paper, so cannot go into that phase of the subject.

Now as to prophylaxis, as practiced by the patient. It is a beautiful thing in theory, but I was about to say an absolute failure in practice, because the patient cannot maintain absolute cleanliness. That inability to maintain proper cleanliness sustains the contention that these oral dyscrasia are but the effects the cause being elsewhere.

We all recognize the perfect physiological type—oral, I mean—when we see it. Immunes, we call them. What percentage of them are immune because of perfect prophylactic care? What percentage remain as immunes after treatment?

It is because there is a balance between anabolic and catabolic function that the immunes are such.

Will prophylaxis prevent or does instrumentation prevent

the precipitation of the lime salts which are in excess in the saliva in this manifestation of functional degeneracy?

What form of prophylaxis must be practiced to prevent calcular precipitation in certain diseases of the eye, or the kidney, or elsewhere in the human body?

I am not deploring the fact that we preach prophylaxis. It is one of the greatest blessings we have given to the world, and is destined to accomplish even greater things, but I do not believe it will prevent or cure pyorrhea as has been claimed for it. I am eager to get at the cause of the trouble, which I feel more confident every day is not of local origin. Soon I expect to present some facts to sustain these deductions.

In all departments of science, people are prone to forget that the effect is but the evolution of the cause, and always commensurate with it.

I wish to express my personal thanks to Dr. Stanley and to the society for the privilege of discussing this subject.

Dr. Stanley—It has been very gratifying to me that this paper has been so freely discussed. I think it will result in profit to all of us. When we once get to thinking along a certain line, it means progress.

Sometimes after a bad pocket has been cleaned out, I think little stimulating agent is beneficial. A very excellent thing is the preparation that Dr. Hartsell gave me the prescription for. It is what he calls azone. It is composed, I believe, of 36% alcohol, and contains alcohol, red oak bark and glycerine in about equal parts. It can be used on the brush or as a mouth wash. You have the stimulating property of the alcohol, the astringent property of the red oak bark and the penetrating effect of the glycerine.

The term "dry pyorrhea," or atrophy, is merely elective, and indicates what is going on. The treatment is the same. Often we see cases which look as if the margin of the gum had been pushed up. There may be pus there, so slight that it is taken up by the circulation. The pus cannot be seen, but the membrane goes and when that goes, the process is apt to go, too. Physicians cannot prevent people from dying, and we will always have pyorrhea; but we will do as the physicians do—cure all we can.

A pretty severe case was referred to me some time ago for

treatment, that of a comparatively young man. He came from a distance and for this reason the sittings were longer than they otherwise would have been, and more severe to endure before the job was finished. He now comes for the prophylaxis treatment once in five or six weeks, and his teeth and gums are improving all the time. The process of repair and improvement will go on in certain cases for one or two years after the work has been done. As a rule, we get pretty quick results in the mouth. Everything is favorable there.

As to the planing of the teeth—the matter of the instrument is merely elective. One man can do better work with a jack-knife than another man could do with the best instrument ever created. In my hands, I prefer these little planes.

Dr. Hartsell claims when there is destruction of the peridental membrane, that denuded surface of the root is a germ-bearing area, and should be planed, destroying the area where germs do a thriving business. Long before I heard him say that I had been doing the same thing and getting the results. We should examine for these little pockets; and if an instrument goes below where the ligament should be it means incipient pyorrhea. Pockets do not bloom all at once. These little bugs could dance a Virginia reel on the end of a needle, and we must destroy the cotillion before it reaches the proportions of an army.

I do not know that I have anything further to say, except that I am more than gratified that the discussion has been an extended one, and the manner in which I have been received. I think I should like to come again—if not to read a paper, to listen to someone else.

The President—Dr. Stanley is perfectly safe in coming here again. He belongs here, being a member of this Institute, and he will receive a hearty welcome from us all whenever he comes. It is quite significant, and possibly prophetic, that Dr. Stanley's office is located on Pleasant Street!

We are very grateful to Dr. Stanley for his very concise paper on this subject, about which we are so anxious to learn, and we feel the paper and the discussion have taught us a great deal about the treatment of pyorrhea alveolaris.

Adjournment.

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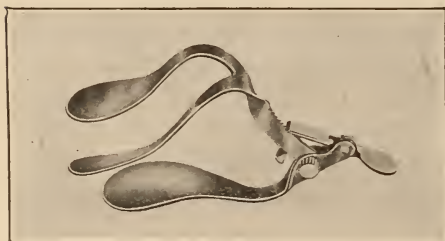
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THE JOURNAL

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THE NEW YORK SOCIETIES.

In the June issue of the JOURNAL, a brief notice was made of the consolidation of The New York Institute of Stomatology, The New York Odontological Society, the Dental Hygiene Council of New York and the New York Institute of Dental Technique, with the First District Dental Society, State of New York. This important merger has been since consummated, and the Society of the First Judicial District has now in hand the very large, difficult and perhaps delicate problem of reorganization upon lines suited to new requirements. We understand that the formation of the various Sections is now under way. These will consist of a Section in Research, in Oral Surgery, in Oral Hygiene, in Operative Dentistry, in Prosthetic Dentistry, and in Orthodontia, and the regular meetings will begin in October.

One feature of far reaching importance to professional journalism is the fact that the transactions of the First District Society will be published in the JOURNAL of the ALLIED SOCIETIES. As our readers know well, the first five years, just passed, of the life of this journal, were years of almost solitary effort in the cause for which it stands. It has remained alive in spite of the inertia so evident in all quarters concerning "independent journalism"—for the simple reason that the percentage of farsighted

men is ever growing who foresee its coming essentiality in the advancement of our professional life. One need only refer to the history of the Journal of the American Medical Association, since its beginning twenty years ago amid the most discouraging conditions, to follow its growth to its present commanding place and function,—one need only view a monumental success which fills a vital want—to gather something of the inwardness of *our* true needs, if we are to take our place in a real sense, among scientific men.

The sentiment in favor of the long deferred but surely coming National Journal is clearly increasing each year. The announcement that one of the foremost dental associations in our country has placed the publication of its transactions in the pages of a journal controlled by the dental profession—is a piece of news full of significance, and of much light and encouragement.

W. B. DUNNING.

PRACTICAL FACTS REGARDING INLAYS.

BY W. A. CAPON, D. D. S., PHILADELPHIA, PA.

When any professional man has devoted twenty years to some particular phase or special work it is to be expected that his experience in that particular direction should have some value as compared to those whose thoughts were more recent and their attention indifferent in comparison.

It is somewhat of this position that I find myself at present in connection with the inlay question. A position of some responsibility in my estimation because this branch of dentistry has assumed proportions undreamed of twenty years ago. This fact forces some of the old guard to step to the front and answer questions that most every dentist has in his mind now, or has had and dismissed as being unimportant or to await a future opportunity. The subject of inlays is particularly pertinent at this time, because they are accepted by the whole profession in some form or other, but you immediately say, we all accept and practise gold inlays, but only a few are willing to admit porcelain on the same plane.

Why not? For it is an indisputable fact that porcelain paved the way for gold, otherwise the advocate of a gold inlay would be assailed by the doubts and opposition once applied to porcelain. It is a fact that for many years the inlay in any form was given very scant attention, but a few were persistent and the patients became interested. This was a force that could not be denied, for when the "laymen wants to know" it is high time for the profession to give some attention and find out. This was done with a certain feeling of animosity, particularly toward these porcelain fools who had the ignorance or audacity to dare to attempt the upsetting of old and tried methods and they grudgingly gave the subject attention. A few years more and the corporal's guard became a prodigious army and we had what is termed the porcelain craze.

This cycle of dental intemperance lasted a few brief years and then receded to its normal position. Just the same as many others we have had, for dental history is made of these cycles or epochs coming, going and more to follow. No use to enumerate

*Read before The New York Institute of Stomatology, March 7, 1911.

them, for they are familiar to us all, but these spells or crazes are good because they help to widen our horizon, and there is in the aftermath something to benefit the profession at large.

Porcelain by many was considered a back number and they eagerly grasped the silicate cement solution, and then, behold, a wizard steps in and changes the whole scene by his method of casting inlays. Any doubt about it? Not one, but the question of appliances to practice this method without delay, for it is accepted by all that this inlay is king. If you are consistent you must accept the inlay in its various phases and give credit to that section which has enabled you to have confidence in what you practice and recommend to your patients daily.

I have said that the dental profession accepts the inlay, therefore a few facts to substantiate this position should be interesting, particularly when based on personal observation covering a long period of years. Porcelain as a filling is a success and it is a failure. This paradoxical position is regulated by the operator and as that is the key to the situation when applied to general operations, it is for me to differentiate in the matter of inlays.

This class of work is different from general dentistry because it requires special considerations and appliances. Its successful manipulation is a peculiar combination of artistic and mechanical skill. This being a fact, it is not a wonder that all were not successful and the great majority after due trial were discouraged and laid their expensive equipment aside. Many of these men recognized the fact that others were successful and they were broad enough to admit it and "let the good work continue" with their approval. Hundreds of others, perhaps thousands, were not so liberal, and condemned porcelain and did their utmost against its use. But the patient would not have it so, therefore silicate cements have been used by the hundred-weight and called porcelain.

This is not honest treatment to the patient and is unfair to the porcelain worker, and the practitioner is placed in an embarrassing position sooner or later. Silicate cements are not a substitute for porcelain because the best of them are only temporary. They have their place, but not as a substitute for porcelain in any sense unless in the smallest cavities when porcelain cannot be applied. It may be contended by many that a silicate

is as permanent or more so in their hands than porcelain. That is quite likely, but that does not alter the fact that it is not permanent and is not porcelain. The question then arises what is permanency? and then we have a variance of opinions impossible of acceptance by all. The permanency of porcelain under some conditions is superior to any other material and under other conditions quite inferior to gold, because tooth structure and position are prominent factors and these considerations must determine permanency. There are many dentists who have been making inlays for upwards of twenty years and a few for a longer time.

There are hundreds practicing the same work for ten years or more and many hundreds for less time and they are satisfied with their individual idea of permanency.

The older practitioner has his experience for support and the younger ones feel that they are as capable and if he has the right spirit will try to do better, and as matter of fact, they are doing better and I am glad of it. It is a pleasure to note their enthusiasm and determination and to hear them say, "How glad they are to have given the work special attention."

My answer to the question of inlay permanency was given in a practical way by tabulating a few facts in a paper read at Baltimore upwards of three years ago, entitled "Porcelain After Eighteen Years." Most of these records are still under observation and the list has had many additions supported by the experience of others who have been working along the same line covering a number of years sufficient to substantiate the record published at that time.

Our records prove beyond a doubt the possibility of saving and keeping in a presentable condition that class of teeth so discouraging to all practitioners. Those of frail construction requiring most careful and continuous attention which predominate in numbers over those of harder structure. It is true that many of these cases seen after many years are not perfect in every respect, but the teeth have been preserved in appearance and usefulness with no detrimental effect on the pulp. Therefore the value of the means of preservation must be admitted for the successful practice of any branch of dentistry is based upon results which terminate to the advantage of those concerned, and

will in equal ratio increase the usefulness of the dentist to the patient. A patient's gratitude and confidence is an asset that every practitioner is desirous of obtaining because it means a reputable establishment founded on perseverance and honesty of purpose.

We will now analyze the conditions as we find them after many years of continuous use under all circumstance. In positions where great force is exerted, such as the bicuspid and molars, we find a broader cement line, caused no doubt by slight fracturing of both porcelain and enamel edges, but not the expected continuous dissolving of the cement to the disadvantage of the tooth structure. This fact must repudiate the argument used for many years against the inlay and was always the chief objection by the opposition. To illustrate and verify this condition: I recently removed a large inlay from a lower first molar for the purpose of treating the pulp which had become affected by decay at the gingival buccal border (Note—This patient seen at long intervals). This inlay comprised the section between the cusps extending distally and involving a large portion of the proximal wall and its removal allowed direct egress to the pulp chamber. The only way to remove an inlay is to cut along the cement line and if possible insert a strong flat blade instrument and force the inlay by this lever. Sometimes the inlay breaks and frequently the tooth is fractured and that occurred in this case, but of no importance for a shell crown was to be the eventual remedy when first diagnosed, however the inlay was removed intact and the condition in that vicinity was most pleasing considering a hard use of 18 years and the age of the patient 64 years. The cement lining was hard and its attachment perfect in every detail. This is a condition we can repeat in many instances, but I hope to have much longer records, therefore I watch them with jealous care whenever possible.

This cement line is labial and other anterior sections is very frequently quite perfect, but there is frequently a dark deposit which intensifies this line. Where the condition exists the same deposit is usually found on the lingual surface of the teeth at the gingival border and where the enamel is smooth and intact. Fillings of other material are likewise affected but the cement lines seems to be more absorbent and its entire removal quite impos-

sible. I am unable to explain the cause of this condition and I make this confession hoping that some of you will assist in the solution of this difficulty. It is a point of inquiry that I have presented to several of our dental scientists, but without much satisfaction up to this period.

Probably the most interesting phase of condition noted in porcelain inlays after a number of years is the apparent change of the porcelain or difference between tooth and the porcelain that did not exist at the time or a few years after its insertions. It is expected that tooth structure changes with time, particularly after middle life, making a marked difference between the inlay and tooth, but there are instances where the defect is in the inlay and can be probably traced to improper manipulation. Overfusing, in my estimation, is the most frequent cause of this defect, particularly if the porcelain is of the low fusing variety. Overfusing destroys the coloring matter and if the mass is not quite porous it is so near that point that its resistance to the oral fluids is considerably reduced, particularly if the glazed surface is removed. Underfusing may also be a defect because in such cases the real shade is not produced through the coloring pigments remaining unaffected and not diffusing the shade and its surface will not have protection of the heat glaze. This would not apply so frequently to low fusing material because of greatly reduced fusing points.

Dr. L. E. Custer in an excellent article entitled "The Bleaching of Porcelain Fillings" read before the National Dental Association, at Denver, July, 1910, and published in *Dental Cosmos*, November, 1910, says, "It was hard to believe that a material possessing the properties of porcelain should change color in time, but the discrepancy of color, which I have seen in many cases, especially in porcelain inlays, shows to an observing eye that the inlay material does change color in time. The bleaching of the color, as I have observed it, only takes place in porcelain baked in a matrix. How inlays, which were inserted twenty years ago, still retain their original color as far as the eye can judge. This would lead us to believe that all porcelain being practically of the same basic formula, the cause lies in the working and baking of matrix-made inlays, for we must exclude any effect of the matrix material upon the change of color of the porcelain as the

bleaching takes place in the mouth, after the matrix has been removed.

I cannot accept this section as conclusive. "The bleaching of color as I have observed it only takes place in porcelain baked in a matrix" because my experience is entirely with the matrix system and I can show scores of inlays that have held their shade and density quite equal to Howe inlays.

It must be noted that the latter system can be used only on labial surfaces, also their form is regular and have only one surface exposed which allows every opportunity of stability. The matrix inlays in comparison are irregular and applied to various positions, allowing in many instances three surfaces exposures which is a much severer test.

Another section of this article reads as follows: "On looking over my records it was found that those inlays which showed the most pronounced loss of color were of the low-fusing variety, whereas those which had preserved their color best were made of porcelains the fusing-point of which was higher than that of pure gold. This aroused the suspicion that these changes take place more rapidly in over-fused than in under-fused porcelain, for while I use a special furnace for each kind, I find it a very easy matter to over-fuse the low-fusing porcelains. It might be said that when they were set in the cavity, some of these inlays were of a lighter shade than intended. The difference in shade, however, was never so great as to necessitate the casting aside of the inlay. The inlay would possibly be one shade lighter, but never four or five numbers, as I have found some of the bleached inlays to be."

I fully concur with these statements for our experiences are paralleled, however there are very many adherents of low fusing porcelain whose efforts have been confined to that material exclusively and their experiences may be at variance with such conclusions.

Dr. Custer being a pioneer in this work and having stated so clearly what I should like to have said, I hope to have your pardon for again quoting the concluding section of his article: "That the bleaching of porcelain inlays is due largely to under or over-fusing of the porcelain. The material comes to us in the form of finely divided powder, each granule of which possesses all the

color of the completed inlay. This color can be changed during the fusing to a lighter color by high heat, or it can be even entirely bleached out by being kept for a long time in low heat. What concerns us is the cause of the change of the color after the inlay has been properly matched and set in the tooth, the change to a lighter shade and in some cases the entire loss of coloring matter as time goes on. In a properly fused inlay, the granules of porcelain have been brought to such a heat that there is a complete coalescence of all the particles into a smooth and uniform product. In an under-fused inlay, the heat has only been sufficient to bring the particles into an imperfect coalescence. We would therefore conclude that the coloring matter has not been decomposed or in any way started toward decomposition. In an over-fused inlay, however, we have after proper coalescence, a decomposition of some of the ingredients of the porcelain which makes it porous, and at the same time the coloring ingredient has been changed to a lighter color.

This decomposition and change in the coloring matter does not seem to stop when the filling has been set in the cavity, but having been started continues owing to the conditions present in the mouth, until the inlay has lost all its coloring and has the appearance of a bleached inlay."

The first ten years of my practice of inlays was with the gas furnace and the destruction of color was a frequent occurrence because it required continuous vigilance to detect the slightest flaw in the muffle. The most infinitesimal was sufficient to seriously affect the porcelain and it is a matter of some pride that most of the work that I have based my records on was done with the gas furnace and is comparable with the later work of more perfect conditions, thus proving that no matter what instructions may be given, the inlay student must work out his own salvation to a great extent and success can only be obtained by constant practice and attention.

After hearing of this paper it may be in the minds of some of you that practicing porcelain is too dangerous and uncertain and some other material must be a substitute. My reply to this thought is: "What can you substitute for porcelain in the anterior section of the mouth with the degree of permanency that I have shown to be possessed by porcelain without returning to the

conditions existing twenty years ago? To do so is an acknowledgement of no advancement toward the ideal and the esthetic. We have some failures but many successes, sufficient to prove that the practice of porcelain is not only desirable but commendable, therefore with the assistance of past experience and improved appliances and facilities there is no reason to doubt the attainment of a standard acceptable by all.

Technical detail is a predominant factor in general operative dentistry and results are governed by the amount of observance to this fact. Making an inlay of any kind compels constant attention to small things and as there is some difference in technique it may be noted to some advantage. Much of the stability of porcelain is attributable to depth of cavity, but with gold this is not advisable because of the great increased and unnecessary cost, therefore the cavity is reduced in size by filling the interior with some other material, generally cement. When this is done some assistance to retention in the form of dove-tails or other locking device is required, otherwise the inlay is not positively secured. The fact of simply cementing an inlay is not sufficient because the adhesiveness of fresh cement to older cement is greatly reduced. To the majority this is an unnecessary warning, but many porcelain inlays were lost through inattention to this fact.

It has been demonstrated beyond a doubt that inlays do not fall out through excessive washing of the cement line, therefore the gold inlay is practically immune from this possibility because of better adaptation. There is supposed to be much value attached to the fact of burnishing the edges after placement. How can there be if the walls are upright and edges square? If burnishing is deemed necessary then prepare the cavity and model for that purpose.

Casting an inlay for all purposes and positions is an extreme both expensive and unnecessary. Expensive because too much time is required to gain ordinary results. Unnecessary because other methods will save time and energy.

I allude to the matrix and Alexander's methods which can be applied to great advantage in many places such as abraided incisal edges. Small corners and approximal cavities, buccal and

labial surfaces and occlusal cavities between cusps. The results can be made equal to casting and the technique is simple with advantage of saving a large percentage of time.

I shall be pleased to explain these methods if so desired.

THE DEGREE OF PREVENTION OF DECAY OF
TEETH OBTAINABLE BY ORAL HYGIENE.*

BY J. MORGAN HOWE, M.D.S., M.D.

The sentiment of speakers and writers on oral hygiene seems to be based on an assumption that if the people can be induced to employ the means indicated by oral hygiene, the progress of dental decay will be prevented, if not entirely, in so great a degree that we are warranted in resting our case on this plea. A great deal has been done to arouse public interest in the people's teeth through dental hygiene councils and examinations of children's teeth, and response has been made by health boards, school authorities, hospital trustees, and army medical boards, in recognition of the importance of teeth in health, for health.

The purpose of this paper is, however, to call attention to the fact that oral hygiene has not prevented decay among those who have been practicing it all their lives, in a sufficient degree to warrant our present dependence on it. In all our agitation of the subject, prevention has very naturally been considered, but when the deplorable condition of the teeth of all civilized people has been revealed, as well as the physical difficulties of dealing with the situation, it seems strange that we should have settled down to an advocacy of oral hygiene with apparent satisfaction that the tooth brush and dentifrices are potent weapons with which to resist the invader. The tooth brush and its adjuvants have, in fact, been on trial for over seventy years; for with the advent of the first Dental Journal—The American Journal of Dental Science—an organized effort was made to impress the public mind with the benefits to be obtained by oral cleanliness, in prevention of decay, and in increase of health.

This movement was ushered in by Dr. L. S. Parmly in 1841, by a paper published in the new journal. In his introduction he says: "It is in reference to public health that I introduce to your attention the care of the mouth and teeth. This branch of education when properly understood will supply the deficiencies under which civilized communities have long labored," and then he explains the necessity of the use of the brush, floss silk, argillaceous tooth polishers and tongue scrapers.

*Read before The New York Institute of Stomatology, April 4, 1911.

At that time also The American Society of Dental Surgeons published six or seven popular essays, on the prevention of disease by the methods referred to, each member receiving gratis 25 copies for distribution among the people, and further supplies were furnished at \$1.50 per hundred to those desiring them. In this way a propaganda of dental and oral cleansing was begun, and with varying interest and activity it has been conducted ever since, from the offices of the better class of dentists.

The majority of conscientious dentists have all through these years been teaching parents, children, and grandchildren the need of constant dental cleansing, and the leaders of thought among us have not failed to keep the subject alive in our periodical literature, so that we may fairly say that the tooth brush has had a trial of efficiency during this whole period.

In addition to this, since the days of Miller's studies down to the present, there has been the expectation that the use of antiseptics in the mouth, and as adjuncts to the brush, would surely be effective in prevention. But the patients who have been faithful to us through long years of our practice; who have been faithful to the tooth brush, and devoted to whatever antiseptic dentifrice we have suggested, whose families have been taught dental hygiene from childhood up, come constantly presenting the evidence so familiar to us, that these means of prevention are effectual in such feeble measure, that in many cases we can hardly keep pace in reparative work with the destructive forces. Fillings, inlays, crowns, and bridges, besides full dentures have been needed for even these heirs of the original propaganda of the tooth brush. These are the people who have kept us busy. While we recognize a certain degree of prevention from such individual efforts, and might expect it to be in proportion to the will and faithfulness with which the means are applied, we find that susceptibility and immunity are the real determining factors, and all artificial measures are secondary. We notice that where enough friction can be applied, exposed surfaces are relatively much safer than those less accessible, but when decided susceptibility exists the unaided efforts of the most faithful person seems to avail but little. The accumulation of debris, in some of the mouths that refined intelligent people are trying to keep clean is due to conditions they are unable to control. The old

expression "clean as a hound's tooth," refers to the condition of a dog's mouth in which the secretions favor cleanliness because they are physiological, and such a dog, or man either, will have clean teeth; immune to decay. Both dogs and men have unclean mouths, leading to dental disease when the secretions are unphysiological.

So it is necessary for us to recommend and urge upon our patients and upon the public the artificial processes that we call oral hygiene, only because we do not know where, or in what respect civilization has led us astray from certain of the paths of physiological living. Until we have learned something about the reasons for the impediments our secretions offer to wholesome mouths, we must keep the tooth brush in operation because it is now the best we can do. The knowledge we have acquired since our profession was organized has as yet had almost no practical bearing on prevention of decay. We have no more effectual understanding of the subject than when Dr. Parmly's paper and the contributory essays were published in 1841; and the present propaganda of oral hygiene would not in another like period advance us in ability to cope with dental conditions any better. It is doubtful in fact if the tooth brush and all accessories will do as well in the future, as in the past, for it is the opinion of some careful observers among our old practitioners, that within the period of their observation, susceptibility has increased and immunity diminished.

Advocating oral hygiene as a final thing, satisfactory and dependable, seems to be due to a mistaken conception. It is really only a tentative thing—in the long view—to be pursued until we can find a better way than we now know; and we should be directing much energy to find a more effectual way, for it is much needed. It seems probable that mouth hygiene will improve the general health in certain ways more than it will restrain susceptibility to decay of teeth; for while much deleterious matter may be prevented from ingestion, and the soft tissues be improved by friction, the cleansing of the teeth is so imperfectly done, when it is constantly antagonized by opposing conditions, that on them the beneficial effects are often hardly discernable. In some cases the general condition of the mouth is clean, but when the condition is one of susceptibility, the adherence

of the bacterial plaque to the teeth is not prevented by brushing, excepting on the more accessible surfaces. The wonderful exhibition of immunity shown by the teeth of the Igorots, as described by Dr. Ottofy,* is convincing evidence that it is a factitious need that makes good teeth dependent on what we call oral hygiene. Paraphrasing an aphorism of former years, we can truly say, in proportion as decay needs prevention, oral hygiene is incapable of effecting it.

The suggestion of Prof. Wm. J. Gies of the Department of Biological Chemistry of Columbia University, that the teeth be washed and brushed with a solution of a vegetable acid, such as vinegar, has had a few favorable reports in cases of great susceptibility to decay and marked inability of patients to keep their own teeth clean, but a sufficient number of trials extending over enough time, have not yet been reported by dentists to give assurance of its results. The reason given by Prof. Gies for the suggestion, was that acids are capable of coagulating and breaking up mucin from its adhesions, and that the degree of acidity required would be so slight that no harm to the teeth's structure could result. This would be a radical departure from former ideas, based apparently on the supposition that dental disintegration is the result of the action of acid diffused through the mouth, and that this should be neutralized by alkaline lotions; whereas the worst cases of susceptibility to decay, have been found when mouth fluids were markedly alkaline to litmus.

There is no desire to discourage the use of the only means we now have of hindering the tendency to decay, but to recall our knowledge of its inadequacy, and to question the wisdom of claiming so much, and of devoting so much energy to advocating 'local means by which so little is effected, while the major influence—whatever it may be—determined susceptibility and immunity receives so little consideration. By all means let us continue to urge and encourage dental hygiene, but remembering its limitations, rather than indulge in such enthusiasm as was recently expressed, "Oral Hygiene has come to mean the science of prophylaxis, or prevention." As if a discovery had been made which invests oral hygiene with a certainty of prevention! That is the impression that seems to have been conveyed, by what

*The Teeth of the Igorots, Dental Cosmos, July, 1908.

many dentists have said and written. Desirable as it is, and beneficial as it undoubtedly will be to induce more people to cleanse their mouths as well as they are able, it will be a much greater benefit to find out why mouths need so much artificial cleansing. A healthy dog's mouth is clean.

The recent establishment of so many dental clinics, in which many dentists are serving the people gratuitously, is a grand manifestation of our altruistic spirit as a professional body; the aggregate of benefit conferred, by needed cure and repair has already been very large; let it continue and enlarge its scope, but let us also consider the magnitude of the urgent need that the people present to us, and our probable inability to meet with credit the requirements of the situation unless real preventive measures are soon available. The aggregate of study and labor devoted to the production of cements for filling cavities, has been very great since the time when zinc-oxy-chlorid was the only cement we had; through the period of the oxyphosphates with their improvements, to the production of the silicates of the various grades. These, as well as the developments attending the use of inlays, are exemplifications in our own field, of what may be accomplished when skill, technical knowledge and a commercial motive are diligently applied, with incentive to seek a goal; and of what we must and will achieve, if we as earnestly pursue effectual prevention of dental disease. But the oral hygiene propaganda and the conduct of free dental clinics has demonstrated that there is enough incitement of a professional and entirely unselfish kind among us to sustain such studies without a commercial motive. Some statistics will be referred to later to show more definitely the facts of the situation, than have been perceived perhaps by some. What is desired is to let the truth of the case be a convincing argument, that the causes of the general prevalence of dental disease, especially of decay, should be sought for by all means we can command.

The Trustees of the Forsyth Dental Infirmary for Children have invited the co-operation of dentists, by asking for suggestions relating to their noble work. The most hopeful and promising statement in the prospectus is that which tells of provision being made for research; indicating, let us hope, that the Trustees of this great institution realize the urgent need of dis-

covering more effectual means of prevention, than oral or dental hygiene now affords. The need for reparative dental work in Boston—as elsewhere—will be so great that even the splendid equipment and large endowment of the Forsyth Dental Infirmary will be adequate for only a small part of the children who will want such help. A sad uniformity in the general prevalence of dental disease has been shown by examinations of children's teeth both here and abroad, and when any consideration is given to the efforts made to treat—by filling and otherwise—those in urgent need of it, a great economic problem is presented: A question of getting enough dentists to do the work and a question of the cost. There were in Continental United States, in the year

1880, 1 dentist to 4,073 persons.

1890, 1 dentist to 3,634 persons,

1900, 1 dentist to 2,558 persons,

*1910, 1 dentist to 2,421 persons.

In order to form a tentative judgment of the number of individuals that a dentist could generally render services to in a year, the statements kindly furnished by six busy practitioners, of the number of their patients last year, resulted in an average of less than 350 different persons served by them. There are in the City of New York, including all Boroughs, 3,051 dentists and 4,766,800 people; one dentist to an average of 1,562 people; this community being much better supplied with dentists than is the country at large. The Public Schools of this city have in them 671,459 children, of whom more than 80 per cent. need dental treatment. Now if we suppose that an average of only 350 of them could be attended by each dentist it would take nearly half the number of dentists in the city to serve them. This is taking no account of a very large number of children in Catholic schools, and in schools of charitable organizations. The number of dentists in this country has multiplied more than three times between 1880 and 1910—there being 12,314 in 1880, and 38,164 in 1910—while the population has not quite doubled; yet there was last year an average of more than 2,400 persons to each dentist. If we should conclude that a competent dentist could on

*The number of dentists in the United States in 1910 (38,164) and in New York City was kindly furnished by the Dental Cosmos. Other statistics were obtained from the U. S. Census Bureau, and Education Board.

the average treat more than 350 patients in a year, say 600, then at that rate the whole number that could possibly be served in the whole country would be only a little more than a quarter of the 92,000,000 people. If to some these figures suggest the need of more dentists, to others a more imperative appeal is, that means may be found to reduce the need for their services. Indeed a statement of facts, representing a body of professional men who are unable to suggest a method of living, or a mode of treatment, that will effect a notable diminution in the occurrence of disease, but each one of them being able to treat or repair the damage done, to only about 600 persons who are victims of the disorder, when almost or quite 2,400 need their service, presents a dilemma that has horns.

We cannot believe that the reasons for the prevalence of dental disease among all civilized people are too inscrutable for modern science, and yet the deplorable conditions that have attracted notable attention both here and abroad have failed to call forth the appeal to investigation which has always been heard when serious departures from health in other tissues or organs have become prevalent. When a disease has become epidemic without known cause, with what eagerness do health boards, and public, too, demand investigation! It may be that because the victims of diseased teeth continue to live, although hampered, they have not been taken so seriously as the much smaller number of sufferers from diseases that generally lead more directly to enumeration in tables of mortality. We as a profession should surely take the conditions as they exist into more serious consideration than to be satisfied with a reliance on hygienic efforts that after the trial we have given them can make no better showing. We might be content to go on in the old way, talking oral hygiene, and filling, repairing, and putting in substitutes for our patients as of yore, but since we have voluntarily accepted the duty of caring also for the people's teeth—have ourselves called attention to their need—we can hardly escape the necessity of attacking the problem in the modern way. Scientific research must ultimately teach us where the fault lies, and the way to correct it. As this is a field in which few of us are experts, it seems reasonable and feasible that we should persuade those who are, to assist us. Our need and our helplessness—

ness, in the face of such a serious problem presents a touching appeal to the research expert to take up our case on a co-operative basis. What else can we hope for? What better way could be thought of?

Co-operation in scientific study is not new. Medical men are often dependent on other branches of science for help, to discover causes, and to interpose preventive measures; engineers, physicists, chemists, bacteriologists have often co-operated with them. The plan is adopted too in many manufacturing organizations. A description of the physical laboratory of the National Electric Lamp Association* states that the investigations conducted include physics, physiology and perhaps psychology, in the study of the production, utilization, and the effects of luminous energy, and trained scientists in the three departments are employed who work in harmonious co-operation.

Except for the fact that the dental schools of America have had such urgent demands upon their abilities in preparing men to practice, in curing and repairing dental ills, we might have expected that something would have been done by them before this in the study of causes and prevention of dental diseases. But now that the demand for more men, or else less need for them has become so much more urgent, we can expect no less of them, than that they shall make their best efforts to diminish the need for their services by instituting systematic research work to discover causes and preventive measures. There are approximately ninety-six dental colleges in the United States, and it would seem as if every one of them could contribute, but especially those schools connected with Universities have facilities not to be found so associated, elsewhere. They have patients in their dispensaries, and they have the expert specialists in each department of study relating to vital processes in the body. In this era of prevention of disease, what shall be said that will excuse our dental colleges from entering on the search for real prevention? Dental societies can also be made centres of interest, at least, by being the means through which the problem can be presented to research experts, and through which the money can be furnished to pay for the time that must be devoted to study of the

*Science, Dec. 24, 1909.

subject. Although dental schools connected with universities may be able most conveniently to study the influences inducing dental disease, the difficulties in the way of such study elsewhere are not too serious. It is an encouraging sign that such work has actually begun. The New York State Dental Society has creditably had a committee on research working on these problems for some time, and Prof. H. Carlton Smith, of Harvard Dental School, has devoted considerable time to study of some phases of the subject. Then this New York Institute of Stomatology, having recognized the need of such work, has been greatly favored in receiving consent from Prof. William J. Gies, of the College of Physicians and Surgeons, to carry on a study of these problems in his laboratory, where, with the assistance of Dr. A. H. Lothrop, work on different phases of the subject has been done as we all know; some reports of which have already been made. But while we feel much gratified that we have the assistance and scientific direction of such able men in this study, we feel it very probable that many factors will be found to influence these conditions of susceptibility and immunity, and because there may be many points of view, the larger the number of minds, trained in research work, that can be induced to consider the subject, the more hopeful will the prospect be. There should be a large number of centres of investigation in this country; wherever dentists can present our problems to directors of scientific study, and gain the co-operating interest that is needed, the work should be started and maintained. There may be need of many contributions of facts yet to be ascertained from various sources before much practical light will appear; but whether the search will need to be long or not, there ought to be no hesitation about undertaking it, and continuing until we understand something of the aetiology and prevention of dental disease.

It is difficult to explain why investigation into the causes of dental disease has not been instituted in Germany, where they have recognized the seriousness of the situation by the establishment of forty dental clinics for children, and where research is so frequently carried on. They have advocated dental hygiene with great zeal, but there as elsewhere the beneficial effects will come far short of preventing decay in sufficient degree to

reduce the need for repair within practical economic limits. This problem of dental decay, apparently resulting from all types of civilization, makes a demand on modern science which our profession must present for elucidation. Medicine is already interested in the question, through Boards of Health and otherwise, because of deleterious effects resulting from loss of masticating power, and from toxic influences generated in mouths full of decaying teeth; but the almost universal decay of teeth is itself an indication of morbid vital processes, an indictment of the influence of civilization on the physical man. It may even be found that the relative susceptibility of different peoples to dental disease, is an index of physical well being or the reverse. Since our profession has done so much to make known the importance of teeth to the people, we cannot stop with advocacy of oral hygiene, and making what repairs we can; the logic of events has placed on us the obligation to deal with the subject in the largest and most scientific way.

REPORT OF DISPENSARIES COMMITTEE OF THE
MASSACHUSETTS DENTAL SOCIETY

May 11, 1911.

As chairman of the Dispensaries Committee, I take pleasure in presenting to the Massachusetts Dental Society, the first report on dental dispensaries in Massachusetts.

A convenient dividing line between past and present conditions is found in the winter of 1908-9. At that time a series of meetings was held in Boston under the direction of the Dental Hygiene Council of Massachusetts, on the general topic of Dental Hygiene. Those meetings were the natural result of an interest which had already been awakened, and in turn, much of what is to make the subject matter of this report followed from the enthusiasm aroused by those comprehensive discussions on health and the teeth.

A very brief review of the conditions which antedated the winter of 1908-9 can not but be illuminating. Since the year 1904 there has been a painstaking examination of the teeth of children in the West Roxbury Home for Poor Children. These examinations have been followed up by so much work as was necessary to keep the teeth and mouths of the children in a healthy condition. It is believed by those in charge of the Home, that this dental service, private in nature and largely rendered by one man, has almost entirely eliminated the expense for medicine and medical attendance.

In the years 1900-1901 examinations of the teeth of children in the schools of Andover were made by the local dentists under the direction of the superintendent of schools. It was hoped that dental dispensary work inaugurated at that time would supplement the examinations. The attempt failed, as your Committee have been assured because the movement was ten years ahead of the times.

Examinations in the public schools of Malden were made in 1907 and again a year or two later. Examinations were made also in Ludlaw in 1907.

Previous to the meetings held in Boston in the winter of 1908-9, dental examinations in the schools of Brookline had awakened a wide interest, and the reports of the examinations

formed one of the most interesting features of these meetings. The painstaking intelligence which attended the examinations, the spirit of service which pervaded them, and the publicity given them, will remain an important landmark in the early history of dental dispensary work in Massachusetts. This work has been continued and still farther developed.

Besides school examinations there had long been extracting clinics at the Boston Dispensary and in a number of hospitals. And at the two dental schools an ever increasing service for those unable to pay regular dental fees, had been educating the public to higher standards.

The charity of the individual dentist and the few beginnings of organized effort, unannounced and little known except to those who were the recipients of this service, was a leaven which must not be overlooked.

Several dental dispensaries were organized before the year 1909. The North End Union Dental Clinic was reorganized in April, 1908. Previously it had been an extracting clinic. The Lynn Dental Dispensary was established in December, 1908. So much for the period antedating the two and one half years covered by this report.

When your Committee came together for their first discussion, it became evident that their principal duty was collecting and disseminating information. Following out this idea, nearly 240 communications were sent out with the hope that directly or indirectly every city and town in the State might be reached.

The larger portion of the inquiries were sent to the school superintendents, but hospitals, dental dispensaries, dental societies, social workers, interested individuals and especially dentists were not overlooked. In answer to these inquiries about 175 replies were received. The greater portion were negative, but many that were negative, were inspiring by reason of the expression of hope and interest.

Without being too careful to limit at first our inquiry to dental dispensaries, in the strict interpretation of the term, it appears that dental dispensary work may be viewed under five heads:

1. Hospital dispensaries.
2. Private or social service dispensaries.

3. School dispensaries.
4. Incidental service of the dental schools.
5. Charitable work of the individual dentist.

While it is possible that as much may have been accomplished by the dental schools and by the dentist in a purely private capacity as in the more organized efforts, it is not necessary to dwell upon these phases of the work at this time farther than to add that to one of the dental schools may be directly traced the enthusiasm which has resulted in the organization of the Forsyth Dental Hospital for Children, and that from the ranks of charitably inclined dentists, have been recruited a large portion of the workers in the dental dispensaries.

There are three hospitals which especially demand attention by reason of their dental dispensary departments: the Worcester, the Waltham and the Massachusetts General. Here we have dispensaries in the strict sense. Taking them in the order above given, they were organized in July, 1909, September, 1909, and February, 1910. The equipment at the Worcester and the Massachusetts General Hospitals is for two and three operators, respectively; at the Waltham for one. The number of dentists rendering service in the Worcester is 24; in the Waltham 14; and in the Massachusetts General Hospital 10. The first two are for children only. The last has no age limit and the range of service is broader than the others. The first is open three half days a week; the second four; and the last every morning but Sunday. In all three a hospital nurse is in attendance. At Worcester 10 cents is charged for admission to the clinic, and 10 cents for each operation. At Waltham the charge is 25 cents a visit. At Worcester and Waltham each dentist cares for an average of four children each half day.

The social service or private dispensaries include the Boston Dispensary Dental Clinic; The North End Union Dental Clinic; the Lynn Dental Dispensary; the Metropolitan Dental Hospital Association, organized in November, 1909, with accommodations at the Harvard Dental School; the Berkeley Clinic, organized in June, 1909; the Hospital for Dentistry and Oral Hygiene, 31 Anderson St., Boston, organized August, 1909; and dental dispensary work in connection with West Roxbury Home for Poor Children.

At all these dispensaries one or two dentists are in attendance, except at the Metropolitan Dental Hospital, which has an equipment for six dentists with three to six in attendance, and at the Boston Dispensary Clinic, which is equipped with four chairs and has two or three dentists in attendance.

The maintenance and control of these dispensaries varies. In two instances one person assumes a large portion of the burden. In the others there is organized control. From five to fifteen dentists render service but in one instance there are forty, several of whom are women. Charges vary from 5 to 25 cents, except in the case of work for the West Roxbury Home, where no charge is made.

It would be interesting and profitable, if there were time, to enter into a more detailed account of the social service dispensaries. Each has its individuality; each its elements of strength and usually its elements of weakness. The history of each would be helpful either along the lines of success or discouragement. One is constantly reminded of how much depends on the staying power of the dentist. Really the future not only of all these social service dispensaries, but of all dental dispensary work is in his keeping. Our dental schools should give no unimportant place to the teaching of social service, if the dentist of the future is to meet the call which will be made upon him.

The school dispensaries of Massachusetts, strictly judged, number but two. They are at Somerville and New Bedford. The former was established in March, 1910, and the latter in March, 1911. But with these must be joined dispensary work at Winchester established in April, 1910, which for enthusiasm, intelligence, method and efficiency is not surpassed by anything the State can show, and a similar condition at Norwood, where, however, the work is about to be centralized in a room which is being fitted up at an expense of \$800.

The dispensary at Somerville is under the control of the school board. It is centrally located in a room in one of the grammar schools, is open three forenoons a week, is furnished with two chairs, two dental engines, a sterilizer and material. Twenty-one dentists render service and at each clinic two dentists are in attendance who furnish their own small instruments. A lady assistant is present at every clinic to make re-appoint-

ments with the children and to keep the records. The children are selected by the teachers and the result has been satisfactory. The children are taken from each grammar school in turn and in each instance re-appointments are made until the work is completed. The record for the past year is as follows:

Children treated, 214.

Fillings (not including 94 treatments), 301.

Cleaning cases, 133.

Minor extractions, 119.

Receipts \$59.46—the charge being 10 cents for the first filling, and 5 cents for subsequent fillings.

The superintendent of schools and the school board warmly support the dispensary and through their efforts in consultation with the dentists, the conditions are gradually being perfected.

The dispensary just established in New Bedford resembles the Somerville dispensary, but it differs in certain particulars. It has a room in the offices of the Board of Health, fitted up at an expense of \$600, furnished by the city. The clinic is open every afternoon except Saturday for primary school children. Five children attend each clinic—one dentist with a lady assistant is in attendance. A good deal of intelligence has been shown in working out the details of this dispensary.

The work at Winchester has been elaborately developed. It differs radically from that at Somerville and New Bedford in that the service, except examinations, is rendered at dentists' offices. The school nurse here plays a most important part.

The following are a few of the regulations governing the dentist and the nurse: Pupils will be selected by the school nurse after consultation with the teacher and principal of the building. Not more than three cases will be taken to a dentist on his appointment.

The school nurse will investigate each case as to the ability of the parents to pay the usual dental fees and in particular she will inquire whether the pupils have previously had teeth filled and by whom.

The charge of 25 cents is intended to include the expected work for each pupil on each appointment.

The school nurse will arrange to take each child to but one

dentist. On the first visit the child must be provided with a new tooth brush and will be taught how to use it.

Each dentist will keep a record of each pupil on cards furnished by the School Department for the purpose and will hand the same to the Superintendent of Schools when the work for the particular pupil has been completed and for all pupils treated, at the end of the school year.

The school nurse is to arrange for talks by dentists in all schools, and to interest pupils by pertinent suggestions. Talks to be brief and to consist of specific directions for care of teeth.

Addresses are to be made by dentists before bodies of older people, principals, teachers, etc.

One can not read the discussions which have been going on at Winchester without feeling how valuable—I had almost said how indispensable—a school nurse may become in dental dispensary work.

In Boston, the school children, under the charge of school nurses, are referred to the Harvard and Tufts Dental Infirmaries, the Boston Dispensary Dental Clinic, and the social service dispensaries throughout the City.

In Cambridge the teeth of 2,500 children have been examined and plans are being pushed for a dental dispensary in October.

In Springfield, while there are no organized dental dispensaries, dentists have a place on hospital staffs and there is much of individual charity work through the medium of charitable societies, for the deserving poor.

In Milton, talks on dental hygiene have been given through the town.

In Canton the dentists work for needy school children at one-half their regular fees.

In West Yarmouth medical inspection reveals that 50 per cent. of the children have defective teeth.

At Falmouth the school physician employs a dentist to examine the teeth of school children and report to parents.

The school physician at Brookfield examines the teeth of school children once a year.

In East Hampton there is inspection once a year and the dentists makes a discount from their regular rate or give their services

In Danvers the local dentists have given talks on dental hygiene.

In Marblehead arrangements have been made whereby local dentists care for the teeth of a limited number of children at nominal rates.

Dentists at Hudson have agreed to examine the teeth of school children free of charge.

Children of Lincoln unable to pay for the services of dentists, are taken to the dental dispensary at Waltham.

The dentists of Chelsea are ready to give their services if the city will equip a dispensary and provide materials.

The dentists of Fall River have formed a local society for the purpose of securing dental inspection in the schools, and it is their intention to establish a free dental clinic.

In Marlboro, Leominster, Kingston and Millis the teeth of school children are examined and a report sent to parents.

In conclusion three points may be emphasized:

1. The differing conception of school dispensaries; that is, should the work be centralized? or should it be carried on in dentists' offices? Somerville and Winchester represent the experiments in this direction, and I have dwelt upon the details of their work for the sake of intelligent judgment.

2. The importance of the school nurse, and also it is to be hoped of the dental nurse, cannot be overlooked. Brookline, Boston and Winchester illustrate the great benefits resulting from the employment of a social worker of this character.

3. If in the past, the idea of social service has not played an important part in the dentist's conception of his calling, it must enter and take its rightful place in the future. The highest conception of the dentist's calling, without the element of social passion, as in the case of the physician and clergyman, should be unthinkable.

HENRY H. PIPER, Chairman.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, March 7th, 1911, at the Academy of Medicine, No. 17 West 43rd street. The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

The minutes of the previous meeting were read and approved.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. H. L. Wheeler—At the next meeting of the Institute we propose to take up the subject of oral hygiene, which is occupying so much space in our journals, and attracting a great deal of attention. Dr. J. Morgan Howe, one of the pioneers in this matter—being the organizer of the St. Bartholomew's clinic about nine years ago—will give the paper of the evening, and we expect some other distinguished men to discuss it.

The President—On Friday, Feb. 17th, an important and gifted member of this Society died at his home in North Adams, Mass.—Dr. Ammon F. Davenport, eighty-four years of age. Dr. Davenport was a pioneer among dentists. He began practice when the profession was less well fitted technically than at present, and being of an inventive turn of mind, he did much, not only for the success of his own practice, but for his brother dentists. He was at one time president of the Connecticut Valley Dental Society, and a faithful attendant upon its meetings. He was an artist as well as a dentist, and your chairman well remembers the gift of what was said to have been a superb crayon portrait of Dr. William H. Atkinson to the Connecticut Valley Dental Society many years ago.

Dr. Davenport had a considerable professional experience in this city, having purchased the practice of Dr. Ballard and pursued it successfully for a number of years, until he turned it over to his brother, Dr. Jason L. Davenport, returning to Massachusetts because of his large interest in real estate there.

COMMUNICATIONS OF THEORY AND PRACTICE.

Dr. W. D. Tracy—I have brought with me this evening a little carrier for wood points. It may be called a porte carrier. Its design has a double interest, as different parts of the mouth

may be reached without laying it down. One end is an obtuse angle, and the other an acute angle for reaching obscure places. In Pyorrhea this carrier is of use for the pumice work. It is made so it will take an orange wood point, and the maker tells me he will soon furnish the wood points to go with it. I have been using shoe pegs, as no doubt many others have done. This instrument is designed by Dr. Frank Skinner, of Chicago, and can be obtained through him. Dr. Gillett, to whom I showed it this evening, suggests that it be given to patients to help in the prophylactic care after we have done what we could for them.

Dr. Gillett—It was Dr. Skinner's idea to get up something inexpensive enough for practitioners to give their patients for that purpose.

The President—Our essayist this evening is a well-known member of this Society. Many of us recollect the demonstration he gave at a special meeting in the house of the late Dr. George S. Allan some years ago—a marvelous one, it seemed to your chairman—packing the mouth with small napkins to keep the saliva from the field of operation.

I take pleasure in introducing Dr. W. A. Capon, of Philadelphia.

(For Dr. Capon's paper see page 227.)

DISCUSSION OF DR. CAPON'S PAPER.

Dr. H. W. Gillett—Of course there is no exception to be taken by most of us to anything Dr. Capon says about porcelain. His experience covers so many years, and he has been so diligent and conscientious that we look upon him as an authority. There is very little I can add. I have heard once or twice of the silicate cements being called porcelain, and sending off patients with that idea, which seems to me a serious proposition. I do not see how anyone can bring himself to do that sort of thing, and Dr. Capon does well to call attention to it. We are perhaps losing sight of the fact, in our inlay work, that there are cases where porcelain is particularly desirable because of the absence of any detrimental influence on the pulp. Although our gold inlays may be made hollow, and the cement lies between the gold and the pulp—the porcelain is still less likely to result in pulp irritation.

Dr. Capon referred to the distressing dark line that sometimes appears around inlays on the labial surfaces, and that in those cases there was always the same kind of deposit along the lingual surfaces. I wondered if Dr. Capon meant that there was a possible gauge of probable results in that respect for us to apply in advance. I think we are all familiar with the fact that the results in inlays of that class vary greatly. All who use porcelain undoubtedly have patients where the appearance of inlays of that class is very satisfactory and continues so for many years. With other cases we are very much chagrined after one or two years to find the appearance is anything but satisfactory; and if there is a guide for us so we may judge in advance, and so protect ourselves it will be helpful.

I am going to add a single suggestion. Dr. Capon has taken up both the porcelain and the gold inlay. I will mention a combination of the two that has sometimes been helpful to me. I do not know who originated this idea. I think Dr. Tracy first showed it to me, but those who use a good many gold inlays and are pleased with the results, frequently have cases in upper bicuspid, and sometimes in first molars, where the use of the gold inlay is indicated and yet where the cavity comes out sufficiently on the buccal surface so the corner of gold is objectionable in appearance. In a number of those cases, I have found satisfaction in having the gold inlay made as usual, except that while it was in the wax stage a portion of the wax was removed with the Roach suction carver just at the point where the gold was going to show. Here is an amalgam die with the gold inlay, and the Jenkins porcelain baked into the recess after it was all finished but the final polishing.

Here is an amalgam die of a cuspid with a labiocervical gold inlay that is only a hollow shell providing for accurate fit and the recess filed with Jenkins porcelain so only a narrow rim of gold shows. This is occasionally helpful where the cavity is not too much exposed to view. In bicuspid a very little porcelain at the point of high light is exceedingly helpful in covering the gleam of gold so the eye of the observer shall not come back for a more critical examination.

The shell is cast and the Jenkins enamel baked right in it. It is a variation from what Dr. Dills will probably speak of—

baking into a gold matrix. I think I have done more of them in this way than I have with the swedged matrix, as he advocates. The process is not adapted to large masses of porcelain, but small masses do very well.

Dr. W. B. Dills—I think it is a great privilege to discuss Professor Capon's paper, and I am much flattered to be asked to do so. I wish he had entered more into his method of taking impressions—matrices, etc. As a rule I think Professor Capon uses more high fusing porcelain than low, while I use more low fusing porcelain. I do not think I could add anything to what Dr. Capon has said, with the exception of a few little schemes I use. The trouble with low fusing porcelain, with most of us, I think, has been over-fusing. I have two rheostats, the use of which enable me to do my work in less time than formerly; I do not bake out the colors as I used to, and I get better results with my shade guide.

Dr. Capon spoke of those cases in bicuspid and molars where the line showed plainly after a certain length of time in the mouth. I have had good results from setting my matrix of 36 to 38 pure gold or platinum—cutting out three-quarters of the matrix and etching that part so as to have direct access to the porcelain. I think that was first brought to my mind from some work of Professor Beck, of Breslau. Three or four inlays which have been in my own mouth five or six years are as good as the day they were put in. If a little of the porcelain or enamel has chipped, it can be dressed down and reburnished.

In regard to the fusing of porcelain, I was surprised at Albany to hear Dr. Byram, of Indianapolis, say he could fuse high fusing porcelain at a low grade of heat—say half the heat usually used—if given sufficient time. I would be pleased to learn Professor Capon's opinion of that.

Dr. Charles Ash—In a little note I wrote Dr. Capon at the time I was asked to discuss his paper, I stated that I hoped there would be something in it I could differ with, as it is very monotonous to have the speakers say they agree with everything in the paper. I find, however, that I can only disagree with him regarding the change of the shade of porcelain. Most of the data Dr. Capon has gathered is regard to that has been of porcelain that has been in the mouth for fifteen to eighteen years, and I must

say I have had little or no trouble with porcelains changing color after they were set. I believe there may be undoubtedly a change in the shade of the porcelain if it is overfused, but not if it is underfused. I think that has been the universal experience.

The cement line, of course, is a question that is very serious in making porcelain inlays—not from the fact that the tooth is liable to decay from the washing out of the cement, but from the unsightly appearance from the secretions getting in there and forming dark lines. I think very few of the porcelain fillings which are made are a good fit, to begin with. I am saying this advisedly. There are some little places where they do not fit, but on the whole they look pretty well, and the operator says, "Well, I am in a hurry, and I will let that go." Either the matrix has drawn, or it has not been properly burnished. I think that is largely the reason that frequently much of the cement line shows. Where a porcelain filling is properly made, and fits the cavity as it should, there is little or no washing out of the cement. We have not yet reached the place, even with the best skill of the profession, of making a properly fitting porcelain inlay. We make some that are marvels to our patients, and sometimes to ourselves; but they are not properly fitting porcelain inlays.

I want to take exception, very positively, to one thing Dr. Capon spoke of, in regard to what I would call these veneer gold inlays. They do not look as if the inlays are proportionate to these wax inlays in those cases. I do not think they are very creditable. If they are used at all, they ought to be made of a platinized gold, which would be sufficiently hard so they would not warp in the handling, but on the other hand, they might be made of a very low carat gold to save the expense. However, a pure gold inlay of that type I would consider impracticable.

I hope Dr. Capon will show the Alexander method. I have had success with it in the few cases where I have used it.

Dr. Babcock—I am very much pleased with Dr. Capon's paper. I remember seeing Dr. Capon do some beautiful work at a clinic at the Central New Jersey Society in Newark some years ago, and his report of the stability and durability of porcelain inlays pleases me. I began doing some inlay work with the gas furnace, and was rather discouraged with it, letting it lapse until the electric furnace came in vogue. I wish Dr. Capon

had brought out more the question of color. As I understand it, there are two practical methods—the coloring that is in the tooth—built up layer by layer—and the other is to combine the two colors. I think we get a better and more lifelike appearance by using the layer method. In most cases we find that they are yellows, or greens, or blues.

Quoting my own experience, I think a little lower heat and a little more time gives better results. I find the low-fusing porcelains are more apt to change color, and are more difficult to build out and contour with, because the difference between the points of fusing is very slight.

Concerning the combination inlays Dr. Gillett mentioned, I found that trouble came if I fused rapidly, because there was a mass of metal underneath which conducted the heat away, and the porcelain was inclined to warp. What success I have had with that method is through the use of a lower heat,, bringing it up gradually.

I want to make one suggestion with reference to very large inlays. With such I like to bake with the patient in the chair, so I can place it back into the cavity and burnish it, if there has been any contraction. In that way a more accurate fit can be obtained in very large cavities.

Dr. Arthur E. Peck, Minneapolis—This form of cavity preparation suggested to me the possibility of the cement interfering with the inlay going to place. Would not a groove on either side of the cavity allow the inlay to slip into position easier and with a firmer seat? I believe that wherever we can use this form of cavity preparation, whether it is for gold or porcelain, we can feel more certain of our retention.

In reference to the brown line which we so often see at the margin of the porcelain filling: is it not due in many cases to the fact that the porcelain is not perfectly square? If it were not square it would leave an acute, fragile edge, which would chip easily, leaving sufficient space for the lodgement of foreign material, causing the disagreeable brown line.

The adaptation to the cavity from the use of the thick or thin matrix, if we are using the impression method, should be the same. The impression represents the exact size of the inside

of the cavity, and a matrix swedged to fit that impression should represent the exact size of the cavity.

Dr. MacNaughton—How do they treat one of those cases—when that little dark line comes that has been referred to?

Dr. Leroy—There are two little contributions that I might make. One is that we might lessen the dark line spoken of on anterior surfaces, which seems to distress us more than the patient, by using 1/2000 platinum instead of 1/1000. The other point is in contour work, using a ground tip, I mean a section of a manufacturer's tooth and fill in the discrepancy between it and the matrix with high-fusing porcelain.

If we use low-fusing porcelain for this purpose, we will come to grief or be dissatisfied with the finished piece.

The trouble with low-fusing porcelain for building slender contours is its tendency to squat—or change shape at the fusing temperature. I see very little excuse for using the low-fusing bodies, since it has been so clearly shown that the advantages of the high are so much greater.

Dr. Babcock—I have tried the 1/2000 platinum, and probably for the purpose of diminishing the amount of cement it is correct; but for some cases it has not substance enough. I found that I could make holes in it, while with the 1/1000 I could work successfully.

Dr. Leroy—The 1/2000 platinum is difficult to manipulate, I admit. The matrix can be sustained by the application of wax, particularly since the addition to our practice of the inlay wax, which shrinks imperceptibly and burns off cleanly. Add that and crowd it into place. Then the 1/2000 can be handled successfully. Such thin platinum usually requires an investment to support it.

Dr. Babcock—I tried a little experiment which was quite successful. Where I fractured a matrix I burnished over another small piece of platinum, and it seemed to heal the wound perfectly.

Dr. F. H. Nies—I am sorry I came in too late to hear all of Dr. Capon's paper, but I did gather a little from the portion I heard and from the discussion. I think that the brown line is unquestionably due to the imperfect adaption of the inlay. It is a misfit, largely due to the imperfect method of making it. We

should swedge over the impression. There is no doubt that the impression method has simplified the making of matrices and has led to great improvement in matrix making, for the swedged matrix is superior in stiffness and adaption to the matrix formed by directly burnishing against the cavity walls. We should not make the mistake of swedging into amalgam dies. A better fitting inlay can be made by swedging over our first impression. To do this the impression of the cavity must be taken in zinc phosphate or in the black oxyphosphate of copper. The outer surface—that surface not in direct contact with the impression—is slightly larger, while the surface that is in direct contact with the impression will be exactly the right size. This method is preferable to making dies and going through three or four operations when one is all that is necessary.

Another possible cause of the brown line is the warping of the matrix. There is no doubt that the matrix is warped by the contracting porcelain. The frail matrix walls are not strong enough to stand the pressure of contracting porcelain when cooling.

I fear to fuse porcelain in gold inlays, as Dr. Gillett does in the finished samples shown. In doing that there is almost always an unequal contraction. I understand gold contracts anywhere from 12/1000 to 20/1000 of an inch, at a pressure of five pounds, while porcelain contracts from 8/1000 to 12/1000 of an inch, 8/1000 in the high fusing and 12/1000 in the low fusing.

If there is an unequal contraction between porcelain and gold there is bound to be a crushing of the porcelain. Many of these inlays, on close examination, are found to be cracked. Some dentists have found a remedy in the use of jeweller's enamel. The contraction of that material seems to be about equal to that of the gold.

There are other men who bake the porcelain in layers. They claim the elasticity of the porcelain saves it. I think the cracking is largely due to the shape of the cavity.

Dr. Gillett—Apropos of the suggestions concerning thickness of matrices, I have no doubt all will recall the very carefully prepared paper presented three or four years ago, showing that none of the cements then on the market were ground fine

enough, so there would be no advantage in a matrix less than 1/1000 in thickness. At that time it was shown that cements all contained granules at least 1/1000 in size.

Dr. Peck—(Illustrating on blackboard). In my opinion it does not matter how thick or thin the matrix is, if we take an impression of the cavity. The impression represents the exact inside of the cavity, and a matrix swedged to it also represents the exact size of the cavity. What difference does it make how thick or thin the matrix is?

Just a word and a crude illustration of how to obtain the margins in swedging over the cavity. The impression should be taken in a cement, which must contract from all directions instead of one which contracts or expands en masse, so the main diameter is not changed. A little paraffine should be used to prevent the reinforcing cement from obliterating the impression cement, or a cement of another color may be used to get sufficient surface to put into the casting ring. We know the trouble of getting a very thin platinum off, but we can use 1/1000 platinum and get an exact fit. That is where the skill comes in getting the impression perfectly. When we use cement it is much more reliable than wax.

The contraction of porcelain is the next consideration. When the matrix is swedged to place, set it in such a way that a counter die of White's fusible metal, that comes in little black squares, can be made. If that is well oiled a counter die that fits exactly can be secured. Invest the counter die into that, and put the porcelain in. For large fusings, it is put into the counter die and pressed into place; when we get our margins perfectly square, instead of having them taper off to an edge, we will obliterate the brown line.

Dr. Dailey—It seems to me the solution of the problem resolves itself into the question of cavity preparation, and if the area be extended beyond the zone of infection, the dark lines will not occur. The interior development of a cavity in the central incisor, for instance, would carry it at an angle of 45°, instead of at right angles, so if that inlay does diminish in size, there will be an overflow or enlargement on the exterior, due to the fact that the width is on the labial surface, which will allow the inlay to seat itself. In seating itself, these margins

will fit closer, because of the inclined plane. The same thing applies also to gold inlays.

Dr. Leslie E. Palmer—A few years ago I was in Dr. Jenkins' office in Dresden. At that time they were experimenting with that same idea—wondering why that cement line still showed—the object being to have the inlay fit the cavity perfectly.

It has always seemed to me that the desirable thing was to be able to reburnish the matrix to the margin of the cavity, or model, before the last bake, in order to correct any contraction that may have taken place at the previous baking. This has been a considerable help to me. I suppose that, theoretically, it seems easier to swedge a gold matrix than a platinum one, in low fusing inlay work, but practically I have not found it so. I found that a platinum matrix that had been annealed and hardened again was easier to handle, while the gold matrix requires to be invested in the little tray and precludes any possibility of overcoming the shrinkage. It has helped me to use the platinum matrices.

Dr. Capon—The reception accorded my paper has been very gratifying. The meeting has taken on somewhat the spirit of the old times, and I feel like saying "Hurrah!" for many dentists have the idea that porcelain is dead. Porcelain is now where it ought to be, in my estimation—in the hands of those who try to handle it intelligently and give the matter intelligent discussion, as we have heard to-night.

I am highly gratified at the different directions this discussion has taken. In the first place, I did not say anything about the preparation of cavities for inlays, for we all have our ideas, and it would take a whole evening to thresh that question out. I would say, like the children who are playing hide-and-seek—that you are all "cold" as far as the explanation of the dark lines about the inlays is concerned. How can it be an imperfection caused by imperfect adaptation when it shows on the smooth enamel, and on the lingual and labial surfaces—in certain cases. The imperfections do not show in every case, and we are glad of that.

I do not care if the line is infinitesimal, and only shows under a glass—there will be a deposit there. It is something peculiar in that person's condition, and does not only apply to the porce-

lain inlay, although it is more conspicuous there. As I said in the paper, I have asked several people who have given these things some study what caused those lines, and they said they did not know; and I do not know. If you can tell me, I shall be delighted, although I would be better pleased to be told how to prevent them. At the meeting in Baltimore the same question came up, and we are no nearer the solution of this trouble now than then. It is not due to the imperfection in the cavity, because the dark line is there in other instances.

I spoke quite feelingly in my paper regarding the use of silicate cements by dentists who speak of them as porcelain. I think this is an outrage. It is done by thousands of dentists, not so much in the better class, but by those who do not care what they say. People are sent to me for porcelain work, because the porcelain work they had before has failed, and I find that this so-called porcelain work is silicate cement, of which fact the patient is ignorant until informed. This does a lot of harm to the porcelain workers. I asked in the paper—what is the substitute for porcelain? I cannot substitute it, and I do not expect to. Therefore I get a little warm when someone comes in and says: "Here is porcelain that I paid \$3 for."

As to the under fusing of porcelain, I think Dr. Dills mentioned that the same results could be obtained by slow and longer duration of heat. I never tried fusing for such length of time, but the concentration of heat will be there, I suppose, by the congregation of the heat units. Start the furnace, and the longer it is left the higher it seems to be on the first step of the rheostat, and by 6 o'clock apparently has the heat of the fourth step.

It is the quick and over-fusing of porcelain that causes so many failures. There is no doubt about that. From the smallest inlay to continuous gum work the over fusing of porcelain will cause more trouble than anything. Under fusing will not destroy, but it does not bring out the qualities of the porcelain. For my part, I prefer an under fused piece to one over fused. In crowns I apply that principle very often rather than run any chances. I leave it for half an hour to an hour, knowing my porcelain of course, and then come back and put it in the tempering oven thoroughly fused.

I forgot to bring a number of old inlays showing that they were not over fused, and that the change of color was not from that cause—the lapse of time causing the change between inlay and tooth. We have no latitude with the low fusing body, and it requires a great deal of practice to get exactly what is desired. The principal objection to its use is the tendency for over fusing. With the high fusing bodies we do not mind 20 to 30 degrees, but in the low fusing that amount of variation would spoil the shade.

I have seen some beautiful inlays spoiled by the opacity of the cement—the changing of shade of this translucent surface; whereas the line was as nearly perfect as we could expect it to be; but it looked bad because of the thinner layer of porcelain. In some respects the lower fusing bodies would be better on account of being more opaque.

I always advocated burnishing a matrix after it had been fused at least once with the basic porcelain. How many times false edges are made the first time? I prefer to work directly on the hard enamel walls of the tooth, which I think better than the best substitute ever made. In many instances the inlay can be made in the time it would take to secure a perfect impression.

In regard to the gold inlays I spoke of, I am not going into any technique, but will say that the casting of gold inlays for every little place is simply nonsense. By porcelain workers, the making of a gold inlay by the matrix method can be done in half the time, and one need not be ashamed to compare it with the best inlay method.

Coming now to the Alexander method, with which Dr. Ash says he is familiar; when Dr. Alexander was in Philadelphia last spring he was using a gold that was not as easy to manipulate as the gold the S. S. White people are putting out now. It will save many hours, because the edges were as good as any cast edges I ever made. I have used a great many, and I think it is a good thing. In regard to this gold, it is so plastic it can be used almost like wax—in fact, it is easier than wax, and it can be used with as much or as little pressure as is desired.

I am delighted that this poor effort of mine has brought out something. A gentleman spoke of the matter being brought up eight or ten years ago at a meeting, when there was a great deal

of talk about porcelain. If anybody should ask if all the porcelain workers are dead, send him to Philadelphia, and I will introduce him to a goodly lot who are using it, and then he can go on to Chicago and find many more, in fact a good proportion of the profession in every city are satisfied that porcelain inlays are very valuable when properly made and applied.

The President tendered the thanks of the Institute to Dr. Capon and all the gentlemen who took part in the discussion.

Adjournment.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the Institute was held Tuesday evening, April 4th, 1911, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The President, Dr. S. E. Davenport, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the last meeting, which were approved.

REPORT OF THE EXECUTIVE COMMITTEE.

Dr. H. L. Wheeler—We are greatly disappointed to-night, owing to the illness of several of the gentlemen we expected, Dr. Porter, of the State Board of Health, Dr. Howe, the Deputy Health Commissioner, and our City Health Commissioner, Dr. Lederle.

Dr. Maxwell, superintendent of schools, whom we expected also, is ill with the grippe, and we regret his absence, because he intended to present the outlines of a plan whereby dentists can aid in carrying on this work of school hygiene.

Dr. Brannan, president of the Board of Trustees of Bellevue Hospital, is also unable to be here.

I have a letter from Judge Barlow, of this city, who has himself established a dental clinic which is doing valuable service. He wrote there was a meeting of the Board of City Magistrates called for this evening, which makes it impossible for him to be here, but that he had written a letter to Dr. Lederle, which would be read. Dr. Lederle's absence therefore deprives us of that letter, so we are doubly disappointed.

The President—The subject of oral hygiene, one phase of which our essayist will take up to-night, is attracting the attention of dentists, of public welfare committees, of settlement workers and of philanthropists all over the civilized world, and it is worthy of much attention. This Society has studied the question from various angles of thought in the past, and to-night we approach it from a somewhat different point of view. Our essayist has written many important papers during his professional career upon subjects of varied importance, and is well known for his independence and his originality of thought. We are there-

fore very much interested to see what view he will take of this important question.

The title of his paper is "The Degree of Prevention of Decay of Teeth by Oral Hygiene."

I have the honor to present our essayist, Dr. J. Morgan Howe.

(For Dr. Howe's paper see page 236.)

DISCUSSION OF DR. HOWE'S PAPER.

The President—The gentleman who is to open the discussion has several reasons for being specially interested, for he is both editor and teacher, and we have only to read his editorial in the last number of the "Dental Cosmos" to appreciate that he not only understands this subject, but that he stands for the highest and best. We specially welcome him this evening as a dentist, and because of his interest in all that has to do with the advancement of his profession.

It gives me great pleasure to be able to present Dr. Edward C. Kirk, of Philadelphia.

Dr. E. C. Kirk—My very dear old friend, Dr. James W. White—and when I look around this audience, I feel like saying "our" dear old friend—used to say that the essence of a good story was its appropriateness as well as its matter; and if we may apply that principle to the paper of the evening, we may agree that it is a very good story, pertaining to the present situation of dental thought with reference to dental hygiene.

It is with no conventional spirit of courtesy to the essayist that I say very frankly that for many years I have not listened to or read any paper that has given me as much aid and as much encouragement as has this one, and I will endeavor to make clear my reasons for this statement.

I have watched with unusual attention from my own point of view the development of this tremendous wave of interest in the subject of oral hygiene, which has spread not only over the United States of America, but over the whole civilized world. I have deduced from this expression of interest that the profession of dentistry is reaching, or has perhaps already reached a point where it will be put to the test of its ability in meeting this important and critical situation. Those of us who have

watched the growth of this relatively young profession, must have been impressed with the attitude which has been expressed so many times and in all sorts of ways, namely the demand for professional recognition—by whom? By the medical profession. We have called ourselves doctors of dental surgery, and have made all sorts of excuses justifying our right to that title, and we are now being put into the limelight not only of medical, but of public criticism, and are being asked to justify our right to the professional status that carries with it the “doctor” title. We have made the demand in all civilized countries, that some attention be paid to the importance of dentistry, that calling which relates to the care of the human teeth, and the mouth, and its contained organs and tissues. We have come to the point where the world is sitting up and taking notice, and asking what we can do. We are demanding the opportunity to show what we can do. Up to this moment almost the sole weapon we have had at our command for dealing with the disease of the people, namely, caries, has been the idea that has been promulgated, that clean teeth will not decay. All that we have done up to date in the prevention of decay of the teeth is comprised within the group of procedure that are at the dentist’s command for keeping the teeth clean. That has been the best we have had to offer in answer to the demand for relief from dental caries.

My position in this matter, with which you may agree or not, is; either it is not true that clean teeth will not decay, or else what we mean by clean teeth is an ideal state of the mouth which it is impossible, under ordinary conditions, to achieve. Certainly all of the methods and means at our command, and their faithful application have not yet served to arrest the progress of caries in any human mouth that is susceptible to carious infection.

The essayist has very properly—and it is one of the features that impressed me strongly—referred to the history of this question, and he has cited the old *Journal of American Science*, established in 1839. The very first effort that was made to bring dentistry into public notice was along the line of oral hygiene, and we have had it with us ever since. Now there is a recrudescence of it, a renaissance; we are going to do some team work and see what can be accomplished, notwithstanding the

fact that it has heretofore failed to accomplished what it was hoped it would do.

Those of you who have paid attention to dental history will remember that not many years ago, about the beginning of the nineteenth century, Bell promulgated the idea that caries of the teeth was an inflammatory disorder. I think that idea had its death struggle in this town. In connection with the inflammatory theory of decay, it was supposed that something within the structure of the tooth caused it. It was even considered an eruptive condition of the enamel, and was supposed to be instigated by lateral pressure of the teeth. I have whole treatises in which the lateral pressure of the teeth upon one another was represented as the cause, and teeth were filed apart to relieve this pressure. For a long period of years human teeth in all civilized countries were mutilated with the separating file. Indeed, the separating file became the chief instrument in the dental armamentarium. Then it was discovered that, while filing may have inhibited this disorder, it resulted in other disorders.

Then the period of contour fillings—restoration of contour with self-cleansing margins, set in. The battle was fought out in Philadelphia, when Dr. S. G. Perry gave the death blow to the theory of the last man who held that opinion, and henceforth lined himself up as a contourist. Then contour become the method advocated for the prevention of these troubles.

Later the axiom of extension for prevention was pronounced, and we have been extending in order to prevent with the result that one man who began to be a little skeptical about this, in the Northwest, said "I do not know where we are going to stop in this extension for prevention idea, for if we keep on extending at this rate, we will soon reach a point where there will be nothing to prevent." And so it has happened.

All these several theories I have related in order to indicate that our attack upon the problem of prevention of caries, up to that point, had always been based on some mechanical means. We have endeavored to treat a human disease from a therapeutic standpoint by mechanical means, and every one of those methods has signally failed, because we have started out with a misconception of the nature of caries. Until we realize the fact that we are dealing with a biological principle, that caries of the human

teeth is a diseased condition, we will never be able to treat caries from a prophylactic or preventive standpoint, i. e. prevent its origin.

Until we regard caries as a question of bodily nutrition, we will signally fail in taking any definite step toward the prevention of this disorder.

I do not wish for one moment to leave in your minds the idea that I would abate one jot or tittle of the interest manifested in this propaganda for the cleanliness of the human mouth. All we are doing should be done. The essayist has referred definitely to the importance of oral hygiene as a preventive for certain disorders. We all know that the human mouth is the portal of entry or the incubator of a vast number of pathogenic micro-organisms, that cause diseased conditions not only of the mouth, but of other parts of the body. We know of the toxemias produced by the constant absorption of these substances.

It has only been recently reported from creditable scientific sources that the entry of the tubercle bacilli through the mouth into the intestinal tract has been found to be a most potent factor in pulmonary tuberculosis. If the intestinal tract in the lower animals is inoculated, within four hours the germs are found to produce characteristic pulmonary reactions. This is only one of the important reasons for mouth cleanliness.

The essayist has spoken of the conditions in the mouth that should be studied. I have made quite a little study of the matter myself, and I think I have, on this very platform, before another association of this city, presented some views on caries of the teeth in regard to the nutritional question. My studies, I may say, have led me not to state dogmatically but to be firmly convinced that the extreme susceptibility to caries of the teeth in many individuals is a nutritional question absolutely. It has to do not with the teeth themselves, but with the conditions surrounding the teeth. We will find the solution of the cause of dental caries not in the forms or structures of the teeth, or their arrangement, but rather in the conditions of the oral fluids that make these fluids the normal pabulum upon which the bacteria responsible for caries thrive, and which bring about the conditions necessary for the localization of caries by the so-called bacterial plaque. I think I have furnished to you the theory by which this takes

place. It is along this line I believe the further study promises the best results.

The essayist has also referred to the methods by which research along these lines is to be brought out. I am not here as an apologist for the dental colleges. It interests me, however, to find that wherever there is a wrong to be righted, wherever there is something to be accomplished, it is customary for essayists to indicate that we are to look to the dental colleges for relief. I think in this particular our essayist is right; but I want to indicate to him, and to you, some of the reasons why the dental colleges have not already solved this problem. I believe it is eminently capable of solution, and I shall be glad to see some of the dental colleges do it.

The main reasons the colleges have not done it, are these: the dental colleges are engaged in the educational business of making dental practitioners. The time of the teachers, and the time of the students is wholly taken up in the effort to produce and acquire a creditable degree of intelligence and skill, to enable the students to practice their profession safely. It is impossible to devote any of the time of the undergraduates to research work, and this must therefore be done by graduates.

I have spent sixteen years—and I say this with a deep emotion—in hunting for the man in the dental classes that had these requirements: the natural intelligence and bent in the direction of research work, the willingness or desire to go into research work, together with the promise that he had a sufficient amount of scientific interest to devote some time to the solution of problems of this character. I found one man in all those sixteen years, and I thought I had the right one. I welcomed him with open arms; but after spending eighteen months with me in the dental course, he decided that the field of dental practice was rather smaller and more circumscribed than he desired, and he is now fitting himself for broader biological work in another institution.

The man who has that type of mind, that intellectual gray matter that fits him for research work, is very much like the individual with the cleft palate in some respects. I have never seen a wealthy individual with a cleft palate. It is a most remarkable observation that one of the most expensive and delicate op-

erations is done in the clinics for people who cannot afford to pay for it.

This type of man is generally poor, and he must immediately get into practice and support himself, or else he must be supported; and he ought to be supported. Any scientific man who has the ability to do research work should be taken care of. Huxley says this man happens about once in 40,000 times—I am not sure that he did not say once in 40,000,000! He is, indeed, a very rare specimen, and should be taken care of. The bread and butter question should be eliminated from his thoughts.

That leads me to this thought: when some philanthropist, or better still, the dental profession, is willing to endow in any of our dental universities an income sufficient to support a young man who is doing this kind of work, we are likely to have it done; but a man cannot be a researcher and a bread-winner at the same time. The men are rare, and when we find them, funds are not sufficient to maintain them.

In closing I want to express my gratitude that the essayist has brought forth this very important subject at a critical time. As I said, at a debate only recently, I stood almost trembling in view of the situation in which the profession finds itself to-day, wondering, as we say in our college work, whether the dental profession will make good, or whether it will flunk in the examinations.

The President—We all regret the absence of Dr. Eugene Porter, Commissioner of Health of New York State. Although Dr. Porter is unable to be present, he has rendered us a signal service by suggesting that Dr. John B. Huber, the well-known lecturer in the service of the Department of Public Health, come in his place and speak to us.

I take pleasure in presenting Dr. Huber.

Dr. Huber—Dr. Porter to-day requested me to take his place at this meeting. I told him I could not hope to do that, but I would come and do my best.

My respect for my brother, the dentist, is profound—especially on the happy anniversary when I sit in his chair; but I never before realized how great a man he was, until I saw some of the wonderful placards put up on the wall at an exhibit of the Den-

tal Hygiene Council. I have made some notes of the things I saw there. For instance, "Teeth are the 'sentinels of the body.'" Then I saw pictures of charming ladies—some with their lips parted so their excellent teeth could be seen—some with teeth that were bad, and others with no teeth whatever. I saw a large photograph of the greatest of modern statesmen, with all his magnificent molars displayed. There was also a legend somewhat to this effect, accompanied by the picture of a mammoth tooth brush—"A brush in time, saves nine" and then the picture of nine very ragged teeth.

It was also stated that "An ideal of clean teeth is as important as an ideal of salvation." I thought that was rather a large contract.

Another was "Let me fill the teeth of the nation, and I care not who makes its laws."

Then Scripture was dipped into: "Keep thy mouth with all diligence."

It was noted that one child in 500 had good teeth on examination, and also that many poor children had spinal curvature, and died!

I learned that the future of the teeth determines the future of the whole world. Also that "A man is known by the teeth he keeps."

I learned that in the human mouth there are about twenty to thirty square inches of mucus surface—I presume that in the colored race the latter obtains.

That recalled to me my days at the College of Physicians and Surgeons. Dr. Pruden made an experiment, and a student from Texas allowed his mouth to be used for bacterial examination. We found some 26 different varieties of bacteria in his mouth and in the interstices between his teeth; I am sure that by this time that number has increased to "57 varieties."

It was advised that the dentist be seen every six months—preferably every three months—and I thought to myself I would be glad if all my patients who are perfectly well would come to me and be looked over as frequently.

The dentist is a most extraordinary man; but even in this day it seems to me he is not as great as he was half a generation

ago, because I have come upon this old note of a certain Dr. Roswell, at 11 Chambers street, New York City. In those days, both dentists and doctors advertised. His advertisement was that he was able to insert gold palates for the restoration of the human voice, and this operation, I understand, has become obsolete; I understand it is not done nowadays.

I am here not to speak in any professional sense; but if I may be permitted I would like to emphasize my view, which I believe is the prevailing medical view, of the relation of the gastrointestinal tract and the teeth. My honored colleague, Dr. Howe, has told us that while dentifrices and all those things will aid in keeping the teeth pure and clean, other things have to be attended to.

A year or two ago, a symposium was devoted to the possibility of diseases of the stomach reacting on the mouth, and I think it was proved to the satisfaction of all that eructations of gas from the stomach produced catarrhs of the upper respiratory tract—of the nose, pharynx, larynx, etc., and I cannot see why they would not react on the buccal cavity.

I have always looked upon a dentist not only as one who attends to the teeth, but as a physician. The ophthalmologist is supposed to know all about the eye, but he must also know when he looks into the eye and finds certain things there, that there are certain lesions in other parts of the body—for instance, renal diseases, which produce certain conditions and cause vitreous humors in the eye.

Now as to the department for which I have the honor to speak—the State Department of Health: Medical school inspections are now in vogue in our large cities, and as you know, Dr. Wheeler and Dr. White of this Society, who are doing splendid service for the State Department, are advocating dental school inspections. In New York City, a printed card is made out, and a large number of things are indicated which may be abnormal in the child, among which are defective teeth. It is really amazing to see how rarely a child presents a perfect set of teeth.

I may submit with deference that I think we have now a very efficient State Department of Health. I think Dr. Porter is doing his best. One of the great difficulties he has to contend with, is

that the Department is striving to carry out ideas which are somewhat new to the people. We are not so fortunate here as in Pennsylvania, where the people seem to be very rich. I believe every year they expend one million dollars for the prevention of tuberculosis alone. In New York State a very much less amount is spent on everything with which the State Department has to deal.

The President—Our next speaker may well be considered an expert on this subject, as he has given a great deal of time and thought to it in many directions. It is a pleasure to be able to again call upon our friend, Dr. W. H. Potter, of Boston—professor of operative dentistry in Harvard Dental School.

Dr. Potter—It has been a great pleasure for me to hear Dr. Howe's paper, and I shall go back to Boston and try to stir up the department of research in the Harvard School. We have a laboratory equipped with all modern appliances, and three or four men who have banded themselves together and formed the Department of Research. Already some interesting and valuable work has been done. They have not yet found the cause of dental caries—and why some people are immune, and others not; but I hope they soon will, or that some one else will.

The problems of civilization, or uncivilization, interest me. Dr. Howe has spoken of the uncivilized or savage mouth as the clean and healthy mouth. Then our problem is to uncivilize the civilized mouth. How can we be civilized beings and yet have uncivilized mouths? Civilization means shelter and protection for the human body—shelter from storms; houses that are weather-proof, clothing that keeps out the cold, and it also means a great deal of shelter and protection for the human mouth. Instead of being subjected to the rough, hard usage which tough and coarse food implies—the mouth is protected and sheltered, and is given soft, starchy foods, which do so much damage to the teeth.

We can uncivilize the mouth by subjecting it as nearly as possible to the food of savages. We can require the mouth to exercise itself—not only the teeth, but the muscles, the glands and the secretions. We can cause the teeth to be subjected to the friction of coarse food, which takes place in the mouths of the savages. In this way we go back to uncivilized conditions.

The thorough chewing of hard food is a perfectly scientific process. We are not dealing with the subject in an unscientific way, if we demand that the public shall thoroughly chew hard food, and that partly solves the problem of decay.

Another thing that pertains to the uncivilized individual and his mouth is a certain mental equilibrium—freedom from care and anxiety. Our mental processes have a very disturbing influence upon the welfare of the oral cavity. We know from experience that severe emotion, not perhaps of pleasure, but at any rate of pain—upsets the general well-being of the mouth, in that the secretions are very much changed. The well being of the mouth demands that the secretions be normal, and the emotions have much to do with upsetting them. We can proceed along perfectly scientific lines in fighting the disease called dental caries, if we insist upon such mental equilibrium as the care-free savage has, so that the environment of the teeth shall be as nearly normal as possible.

I am afraid that Dr. Howe has not given a complete idea of what oral hygiene means. To my mind oral hygiene does not mean simply a campaign for the artificial cleaning of the mouth and teeth. It goes much deeper than that. We cannot touch any one part of the body without touching the fundamentals of the life of the body. We cannot teach oral hygiene without teaching principles having to do with the health of the whole body.

Tuberculosis is fought by building up every source of strength of the individual, and dental decay must be fought along similar lines. All teaching of oral hygiene must include the fundamental principles of nutrition; the welfare of the whole body must be considered if we are to treat a part.

If, then, we can uncivilize the mouth—going as near as we can back to the primal condition of the savage—the mouth will be improved. Laboratory research must all the while be trying to find out the real cause of dental caries, and while it is conducting its experiments we must not cease urging the artificial cleaning of the teeth as a preventive measure. In this way we can hope to produce a great influence upon the large number of mouths in every community which are seriously affected with dental caries.

The President—In this room is a gentleman who has given a

great deal of thought to this subject, one who is doing splendid work in connection with the dental clinics of Philadelphia, and we would like to hear his opinion. I will call upon Dr. P. B. McCullough.

Dr. McCullough—It is a treat to be present to-night to hear this scholarly essay on the line of advance in dentistry, and the equally splendid discussion. Another phase of the problem presents itself to us as dentists: whether we will make good. We must make the most of the talents with which we have been endowed in the interests of society and do what we can to prevent a continuance of the present conditions. We cannot at once hope to remedy them even by the discovery of a man willing to try to regulate the carbohydrate and proteid diet and prevent dental caries—when as Dr. Kirk with a great deal of pathos asserts he has been sixteen years trying to find a man fitted for the work!

Some sage says "if half of society would engage in duties that are immediately before them, instead of chasing phantoms, our progress would be twice as rapid." Ninety per cent. of the first molars of all the children in this community have cavities. Those children do not use the tooth brush, and if they did, it would make but little difference, because the cavities are already there. If we tide over a period of susceptibility to decay, beginning with the first molars, and watch them so as to prevent pulp involvement, carrying all the teeth safely over the eighteenth year, they will not need to see a dentist until they reach the age of pyorrhea, and then only for attention to keep the teeth from dropping out.

With this small army of scientists we can only accomplish a certain amount. How much can we accomplish that will be definitely and lastingly good, that the public will appreciate at the end of twenty years? Some dentists say "I do not care what happens to the first teeth in the public clinics, although I do with my own children and those in my private practice." Do not treat the permanent molars that are pulpless, but attend to all the first molars that are yet vital. Dental records prove that an infinite amount of work is done that is of no value. If all that time were used for the first molars, thousands of children would be reached, and thousands of first molars saved. There is hardly a man in this room but has lost several of his molars. There is hardly a

teacher who has not lost some of his molars, because they did not individually appreciate the value of their preservation during that very short period in childhood; so it is during that time, and to those special teeth, that our efforts should be chiefly directed.

Dr. H. L. Wheeler—I came prepared to listen to-night—not to speak—and the wisdom and wit that we have listened to has rather overwhelmed me. I would like, however, to call attention to one or two things that have not been emphasized. One of the greatest reasons for this interest in oral hygiene is not so much the prevention of caries, as the prevention of the diseases that are brought about by infection through the intestinal tract. That is what I understand from Dr. Porter is one of the chief reasons for his appointment of dentists on the Board of Health of the State of New York. His idea is to have them work in conjunction with the men of the other branches, such as the experts on eye and throat troubles, and on scarlet fever, sanitation, etc., so as to complete the circle—men who are somewhat acquainted with the relation of the condition of the human mouth to infections that occur and cause general disease. This is one of the chief causes, then, in my estimation, of the necessity for dental clinics. I am heartily in accord, not only with the essayist, but with Dr. Kirk. I believe the question of finding a means for prevention is one that is paramount at the present time; but I do not believe that to hamper or hinder the reasonable intelligent advance of this teaching of mouth hygiene would be of any assistance. I believe we can make them go on together, and they can and should be of assistance to each other.

Although not speaking with authority, I wish to outline the proposition which I understood from private conversation Dr. Maxwell was to suggest here to-night. Superintendent Maxwell can say more in five minutes, and more directly and understandingly, than any man I ever met—and this is no reflection on the rest of my friends. He says that if the dentists will get together, and decide on fundamentals, he would endeavor to influence the Board of Education to have published short pamphlets of three or four pages, which would be distributed among the teachers, and utilized by them as a basis for teaching mouth hygiene to the children. That seems a simple thing, but it is fraught with wonderful advantage, if it is taken up by the dental profession, and

can be given out as the authoritative idea of the best of the dental profession, as to the fundamentals of a clean mouth.

We regret the absence of Dr. Lederle, because he has shown a great appreciation of the work the dentists are trying to do. About a year ago he offered to work in co-operation and harmony with an advisory committee to be appointed by the Dental Hygiene Council, taking their advice in matters pertaining to questions of mouth hygiene that come before the Board of Health. This committee was appointed, with Dr. Karl C. Smith as chairman, and I understand Dr. Lederle has called in this committee on every such question. I believe it is no secret that the Departments of Health and Education are ready to work with us in this matter.

It has been the desire of the Dental Hygiene Council to become a section of the First District Dental Society, and we look forward with expectancy to the annual meeting this month, when we hope that will be accomplished. The Council would then be in a position to treat officially with the various public representatives of the people, such as the Board of Education, the Board of Health, and the hospital departments.

We miss Dr. Brannan to-night also, because he is president of the Board of Trustees of Bellevue and Allied Hospitals, and has taken an active interest in this matter. Hardly had dental clinics become an established fact when he urged the establishment of such a department in Bellevue Hospital, the largest emergency hospital in this part of the country. The dentists are appointed there with the same titles as the medical men.* We are also to have a dental interne, who will serve on the same basis as the medical internes. This is making progress. We doubtless have made mistakes, but that is ever a part of evolution. This subject is most important, and if carried on with a willingness to sacrifice on the part of the dentist for the good of the profession at large, and for the good of the public—with the co-operation of these departments that are now so ready and willing to assist us along reasonable lines—I am sure will bear fruit in the matter of solving this problem: the prevention of

*The interne is now established in the Bellevue Dental Department. July 14, 1911.—H. L. W.

dental caries, and the prevention of infection through unclean and unkept mouths.

Dr. S. G. Perry—I am glad to be called upon, for it gives me the opportunity of paying a very just tribute to what I consider a very remarkable and valuable paper. We always get valuable papers from Dr. Howe, but he outdid himself in this. We are also indebted to Dr. Kirk for the history he has given us. Now comes the time for another departure, and it will not concern the dental profession alone, but a large part of the general public, and more than all, the very needy and the very poor. We are coming into our own. The change has been coming slowly but surely, and the greatest significance after all in this new movement will be that chance for the dental profession to do what the medical profession has been doing for generations—to do not only for itself, but for those who need, and also for the opportunity of setting itself right before the public. We brag a great deal about being scientific and deserving to be classed with medicine and surgery; but how often have many of us stopped to think of our relation to the public, unless it be the wealthy public that can pay large fees. How many of us have stopped to think of the poor who need their teeth as we do, and who have absolutely no means of conserving those important parts of their bodies?

To me the greatest significance will be the advantage that will come to the public at large, and it will react upon us, because it will help us to a higher plane and make us feel we are helpful. I know nothing more encouraging in old age than to try to be helpful.

Dr. Bogue will bear me out in saying that thirty years ago, or longer, I had a scheme for a professional building, which might be owned by half a dozen of us, and also for the banding together of perhaps a dozen men whose services should be given a month apiece to the poor. It was not to be a clinic that should change its spots and turn into a dental college, but it was talked about among us, to help the poor. I made application to one of my rich patients, asking if she would make a contribution if some others could be found to join with her to open a room where some of us could try to be helpful to those who needed our service, and perhaps in that way an organized effort could be started to

look after the poor. Her reply was, "Well, what has your profession done, and what can it be depended upon to do, in case a reasonably large sum would be given? Where is the evidence of your having done anything?" I could not answer, because nothing had been done. To make a long story short, I was not able to get a dollar from that lady, I became discouraged, and nothing ever came of it.

At the dinner given to Dr. Meeker some years ago I ventured to speak again on the subject of the need of the poor, but I never dreamed it would go like wildfire, as it has done, and I think it is one of the most hopeful things in the dental profession. It has gone all over the world, and now there are clinics under government control and guidance. It will not be long before we shall do in a fine, worthy way what many of us have wanted to do for a long time.

The President—I will call now upon a gentleman who is doing a great deal of good among the fathers, mothers and children of this section. He has been instrumental in having lectures given in the public schools and institutions, and has given the matter attention for a long time. I take pleasure in calling upon Dr. Hyatt.

Dr. T. P. Hyatt—I am very glad to be called upon to say a few words, and only wish I had the eloquence of our dear friend, Dr. Perry.

About eleven or twelve years ago I advocated the education of the public on the question of oral hygiene as an important factor in the general health of the body, claiming that we would not only be performing our duty to our fellow men, but would also raise the profession of dentistry to the plane which it ought to occupy. I am sorry to say the profession at that time was not ready for it.

The essayist says that oral hygiene is nothing new. In that I disagree with him. Had the essayist said the teachings for cleaning the teeth is not new, he had been right, and might have added that this was taught thousands of years ago, even in the days of the Egyptian rule. But the oral hygiene movement of to-day is radically different from what it was even twenty or thirty years ago.

This difference consists in showing the importance of the

condition of the mouth in relation to the health of the whole body. I am glad Dr. Potter spoke of this and that Dr. Wheeler also emphasized it.

The great importance of oral hygiene is not so much the saving of teeth as conserving the health of the whole body. An unclean mouth contaminates all the foods that are intended to nourish the body. It is this idea that differentiates the present oral hygiene movement from the old teachings of how to keep the teeth clean.

While some may question the truth of the statement that "A clean tooth never decays," none can deny that a clean mouth affords more favorable environments for the preservation of the teeth and provides for the passage of food in a more healthy and clean condition.

Dr. J. Morgan Howe—The degree of prevention of decay attainable by oral hygiene may fairly be judged by the past, and the decay of the people's teeth must be ultimately restrained by other means. Such influences as may be exerted by diet, by methods of living, and general hygienic conditions may bring about a common condition of the mouth such as we see in the rare cases of immunity that occasionally appear.

The question naturally arises, as was well expressed by Dr. Kirk, will we make good? My idea is, we cannot make good unless we know more than we do now, and in order to know more we must go at it in a different way. The suggestion that has come to us, in the Institute, and the work we are doing—continuing now through a second year—has in view the bodily conditions that change the secretions of the mouth, which in some way influence the teeth favorably or unfavorably; in other words, the conditions of immunity and susceptibility. Dr. William J. Gies, professor of biological chemistry in the College of Physicians and Surgeons, was responsive to our appeal, because he saw the importance of the problem, as well as the scientific interest connected with it. Members of this Institute try to render him all the assistance possible in directions which he has indicated as desirable. I suggest that we cannot wait for another Dr. Miller to be developed, to take up the research work where he left it. It is many years since he made the discoveries that we have found inadequate to suggest preventive measures. If the agitation for

such work is extended, and public interest is enlisted, a demand will be made on scientific men that they investigate this subject, because it is for the interest of the people. Professors of physiology and biological chemistry in universities having dental departments should have this problem presented to them by the dental schools, for such work may be carried on more conveniently in a dental school than anywhere else.

The President—In closing this very successful meeting, the Chairman desires for himself the privilege of thanking every gentleman who came out this very stormy night; and for the Institute, to thank every gentleman who has spoken. A number of them left their circles of activity at great personal sacrifice.

Adjournment.

A meeting of the Massachusetts Board of Registration in Dentistry will be held in Boston, Oct. 25-26-27, 1911.

For application blanks and further information apply to Dr. G. E. Mitchell, Secretary, No. 14 Water street, Haverhill, Mass.

HORATIO COOKE MERIAM, D. M. D.

Born Mar. 20, 1849. Died Aug. 11, 1911.

This simple announcement of the passing away of many men tells all there is to tell of many lives. How splendidly different it is in the case of Dr. Meriam.

I knew him well as a young man, we were classmates in the Harvard Dental School and worked together for our degree. His companionship was wholesome and sweet and his early manhood gave bright promise of his future career.

Later the profession came to know him. To know him as a man of sterling integrity and great professional worth. He was an eloquent advocate of every measure that had an uplifting influence and gave freely of his strength and great ability to the solving of the educational and ethical problems of our profession. He was versatile in his tastes and accomplishments and was fond of the practical. Hour after hour he spent searching the shops for efficient instruments and tools that could be purchased at a much less cost than the price list of our dental depots. In this way alone he taught us all how to save and materially helped the beginner who was limited in his means to buy his dental equipment.

He loved the beautiful in nature and in song, and enjoyed the cultivation of rare flowers. His death is a great loss to his family and to our profession and to the world. It is, however, a great comfort to know that his character and worth will continue to shed their influence over the future generations of dentists.

EUGENE H. SMITH.

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No. 4

PROCESS PATENTS AND THE PERVERSION OF THE FUNCTIONS OF A PROTECTIVE ASSOCIATION.

Let us analyze the meaning of the words "Letters Patent," which the U. S. Patent Office grants.

When an article is "*patented*" it is meant that "letters patent" have been issued to some one as the inventor.

They are called "*letters*" because they are messages addressed to the public, and "*patent*" because they are open—to be known to all.

When an inventor conceives an invention, he first perfects the same and then applies, usually and preferably, to some Solicitor of Patents or Attorney in such causes, for preparation of the specifications and drawings, who carries the application to a final conclusion with the patent office.

So far as the examiner of the particular department applicable to the case is concerned, he, first, ascertains by examination of models, books, literature, circulars of any description or of other means within his jurisdiction, or on files in the patent office; and finding nothing similar or antedating its new and useful claims, allows a patent on the invention and in due course it is issued to the inventor or his assigns in conformity to the office rules.

Now what has recently happened? A Chicago dentist claiming to have produced a new and useful invention on a process in dentistry has secured letters patent (application filed Jan. 12, 1907) dated Dec. 3, 1907, numbered 872,978, and enters suit in the Federal Court of the District of Columbia against a prominent Washington dentist, claiming injury to himself, by the defendant's using his method or process in his professional duties. On the other hand the defendant claims the patent invalid through prior use by others.

Thus far both are legally right in their premises; but both parties to the suit and their friends proceed to try the case—in advance of any Court decision—in the various dental journals.

In the discussion the patentee takes offence at any person questioning the validity of his patent.

Now in the eyes of the statute the inventor has legal right and privilege to the possession of his alleged invention under letters patent granted to him until some one aggrieved through Court procedure, questions his right and proves its prior use. This the defendant is endeavoring to do, through witnesses and experts, to show that said invention has been used or worked by others long prior to the patentee's conception of said invention.

The writer deprecates the granting of process patents, meaning all patents on manipulative skill or ability entering into the humanitarian side of medicine or dentistry: such a curse should be wiped from the statute books by dentists or physicians memorializing Congress to amend the law.

So long as the law gives the right to grant such patents, the writer sees no valid reason for questioning the granting of process patents, but he does object to the foolish notion, which friends of the patentee seem to claim, that the defendant has no right to defend himself by trying to prove the patent invalid.

THE PERVERSION OF THE FUNCTIONS OF A PROTECTIVE ASSOCIATION.

There is no necessity to rehearse the history of the Dental Protective Association of the United States; suffice to say that up to a recent date the chairman of this association had proven his worth and ability in combating a number of process patents in the United States Courts, thus benefiting its members and incidentally the whole dental world. He deserves the credit due for the noble sacrifice and work performed which covers a period of upwards of twenty years. Why then has he gone wrong by "flopping" or turning a complete somerset during a comparatively recent period?

This sudden change of front, to my mind, deserves severe criticism for the attitude which he has taken to assist his friend of long acquaintance—in favor of a process patent—through use of the machinery and funds of the Protective Association, without legal consent of its members.

The question in dispute between the members and himself as to the legality of his act, is the claim he took upon himself to conclude an agreement with a patentee of a process patent, binding the members of the association to pay a certain sum of money for the right to use said process, and the association as the collection agency. A few days afterward a snap meeting of the association was called by him to ratify or legalize an abominable agreement, by changing the constitution to conform to his acts. Why this "flop" favorable to process patents after the fight of twenty years against them? To my mind his reasons are fallacious. He claims to have examined all the testimony which has been adduced and decided offhand that the plaintiff will win and writes Washington to that effect.

I question the right of any man to decide for me in a meeting of this character without my consent, and especially so as the writer never knew of such a meeting until long after it was held,

although he has been a member for the past nineteen years and paid in twenty dollars; and the writer further questions his snap judgment meeting for the 5,000 or more members of the association.

What right has he to anticipate for these 5,000 members when the suit is still pending in the courts and no decision as yet? He claims he did the trick to prevent the members suffering in the event of the plaintiff winning. That remains to be seen. Does not his acts and arguments savor of collusion to help validate the patent of a friend by the use of the association?

Why did not the patentee bring his suit against a member of the association in lieu of a non-member? Was it because the chairman of said association did not desire to use the machinery and funds of the association against a personal friend? It certainly looks that way. Such conduct naturally conduces to hatreds and to make enmities irreconcilable.

WALTER E. BOARDMAN.

ATTEMPTS TO IMPROVE THE GENERAL METHOD FOR THE QUANTITATIVE DETERMINATION OF SULFOCYANATE IN SALIVA.¹

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I. INTRODUCTION.

It gives us great personal pleasure to report, to-night, the results of the several studies which we have lately had the privilege of conducting under your auspices. As your printed program indicates, Dr. Lothrop, and Messrs. Smith and Baker, have co-operated with the speaker in the execution of parts of the plan of research which we had the honor last November to present for your consideration, and which received your cordial approval.

It was late in the fall before this second cycle of the work in which we are mutually interested could be inaugurated. Meanwhile many unusual difficulties have been encountered. It would be very agreeable to us if we could relate, to-night, the whole story of the etiology of dental caries and suggest the most perfect prophylaxis for it. We cannot do more, however, than state the results of the researches which are now in progress in our laboratory and which we trust will help to pave the way to a successful fulfilment of the aims that you cherish and the hopes which we entertain.

The main problem—the essential cause of dental caries—has heretofore baffled all investigation. This well known fact acts upon us as a stimulant, however, not as a depressant; but it also

¹The substance of this paper was presented extemporaneously by the senior author before the New York Institute of Stomatology, May 2, 1911, at the New York Academy of Medicine. This is the third paper relating to studies of dental caries which Dr. Gies is directing under the auspices of the New York Institute of Stomatology. The previous papers were published in this Journal: (1) Lothrop and Gies, 1910, v, p. 262; (2) Lothrop and Gies, 1911, vi, p. 65.

leads us to feel that you cannot be impatient regarding the rate at which a solution of the problem may seem to be approached by us and that you recognize with us the inherent perplexities of our task.

In the first of our reports to-night we shall refer to some unsuccessful attempts to improve the method for the quantitative determination of sulfocyanate.

Sulfocyanate has been, and continues to be, a matter of unusual interest in work on dental caries. Bunting recently made an experimental study of the possible influence of associated salivary constituents on the classical method for the quantitative determination of sulfocyanate. He concluded from his results (1) that the classical method is defective, (2) that such substances as diacetic acid, which occur in saliva and which react tinctorially with ferric chlorid, tend to make the analytic figure for sulfocyanate higher in quantitative determinations than it should be and that, consequently, (3) all previous results pertaining to the proportions of sulfocyanate in saliva, as well as the deductions therefrom, are open to question.

Bunting's analytic results seem to warrant these conclusions. Nevertheless confirmatory data must be obtained before we can safely assume that all his deductions are correct, just as is always the case in guarding against the unavoidable errors which all of us are prone to make.

About a year ago, in seeking new and better methods for the removal of lipins from biological materials, the speaker suggested to Dr. Rosenbloom, one of his associates at the College of Physicians and Surgeons, that experiments be performed to ascertain whether lipins would diffuse through rubber membranes. Accordingly, Dr. Rosenbloom, using ether as the extractant, removed lipins from egg yolk, placed the extract in a perfect rubber bag and immersed the lower part of the bag in ether. Rapid diffusion of egg yolk lipins occurred. We have since performed many similar experiments with identical results.

In extending the field of observation in this particular connection, the speaker had occasion, recently, to determine the diffusibility through rubber of various ether-soluble, *non-lipin* substances, among them ferric sulfocyanate—the red substance which

is produced in the classical method for the tinctorial determination of sulfocyanate in saliva. To his great delight, this substance very readily passed from ether solution through rubber to ether. The possibility of basing upon this property a particularly accurate method for the quantitative determination of sulfocyanate in saliva at once became apparent and seemed to deserve prompt attention.

(The diffusion phenomena which are mentioned above were demonstrated at this point.)

In planning a series of experiments to determine the possibility of basing a quantitative method of sulfocyanate determination on the diffusibility of ferric sulfocyanate from ether through rubber to ether, a number of practical points demanded preliminary study. Would a saliva-acid-ferric chlorid mixture containing the resultant ferric sulfocyanate, yield to ether *all* of the contained red compound when thoroughly shaken (washed) with ether? Would all of the contained red substance diffuse from an ether-saliva-acid-ferric chlorid mixture through rubber into surrounding ether? Would the analogous red compound with diacetic acid show the same properties under these conditions or would it be quite unlike the sulfocyanate in one or more important respects and thus afford favorable opportunity to test Bunting's conclusions from a new standpoint?

Our experiments along some of the lines just indicated, which were performed very carefully by the junior author with the speaker's co-operation, are briefly described below.

II. EXPERIMENTAL.

Our experiments thus far have been simple diffusion experiments with rubber bags holding solutions or mixtures containing ferric sulfocyanate.

METHOD OF CONDUCTING THE DIFFUSION TESTS.—The solution to be tested was poured through a funnel into a rubber bag.² The bag (8 inches long) was lowered into a narrow salt mouth bottle (about 7 inches high) until the bottom of the bag nearly

² Condoms were used in these experiments. Imperfections in these very thin rubber bags are readily detected. None of the results was due to defects in the rubber.

touched the bottom of the bottle. The bottle contained the liquid in which diffusion products could be received. The part of the bag which protruded from the mouth of the bottle was turned over the edge of the mouth of the bottle. A cork stopper was inserted in the mouth of the bottle to keep the bag suspended in the original position. The cork also prevented evaporation of volatile materials in the bottle and bag.

FIRST SERIES OF DIFFUSION EXPERIMENTS.—*On the diffusibility of ferric sulfocyanate from ether solution through a rubber bag into ether.* About 15 c. c. of deep red ethereal solution of ferric sulfocyanate (obtained by shaking an aqueous solution with ether) were subjected, in a rubber bag, to dialysis in about 15 c.c. of ether. Sulfocyanate passed to the exterior promptly. (This experiment was repeated many times with the same result in every instance.) By frequently renewing the volume of external ether, apparently all of the internal ferric sulfocyanate can be passed through the rubber in such experiments.

Such observations as these aroused the hope that sulfocyanate in saliva might be determined quantitatively through a proper control of this capacity for diffusion through rubber membranes.

SECOND SERIES OF DIFFUSION EXPERIMENTS.—*On the diffusibility of ferric sulfocyanate through rubber in the presence of alcohol and water.* When a saliva-acid-ferric chlorid mixture is treated with ether, the latter floats on the former. Although ferric sulfocyanate can be washed out of the mixture by thoroughly shaking the liquid with ether, it seemed probable that the volume required for this purpose, if applied to the saliva *directly*, would be too large for purposes of quantitative diffusion. (*Thus far we have made no tests on desiccated saliva.*) We concluded that possibly the addition of alcohol in small though sufficient quantity to facilitate the mixture of given combinations of saliva-acid-ferric chlorid and ether, might make the mass relations for the proposed diffusion tests entirely satisfactory.

This matter was first tested in experiments with *concentrated* ethereal solution of ferric sulfocyanate obtained from aqueous solution by extraction with a moderate excess of ether.

A.—The conditions and general results in one of the first experiments in this series are shown in Table I.

TABLE I.

BOTTLE No.	LIQUIDS INVOLVED.				RESULT Dialysis of sulfocyanate 24 hours
	INSIDE		OUTSIDE		
	Ether solution of ferric sulfocyanate c. c.	Alcohol c. c.	Water c. c.	Ether c. c.	
1.....	5	5	5	30	+
2.....	8	4	4	30	+
3.....	12	3	3	30	+
4.....	12	2	2	30	+
5.....	14	1	1	30	+

This experiment was begun on February 11 between 10 and 11 A. M. At 4.40 that afternoon the colorations in the diffusates were cumulative in intensity from bottle 2 to bottle 5 inclusive, but the external liquid in 1 was colorless. On the other hand, there was marked increase in the volume of the *internal* liquid in 1 but the imbibition was decreasingly less in degree from 1 to 4 and was imperceptible in 5. At midnight these effects were more striking, and sulfocyanate had passed into the external liquid in bottle 1. On the following morning a practically colorless *layer of water* had formed in all bags except the one in bottle 5. This effect appeared to depend on diffusion of ether into, and alcohol out of, the bag. Practically all effects were at their maximum on the morning of the 12th. The diffusion of sulfocyanate was slight in 1 but increasingly more marked from 1 to 5. The volumes of the internal liquids at 3 P. M. (Feb. 12), when the experiment was discontinued, were noted as follows: 1—31 c. c., 2—30 c. c., 3—25 c. c., 4—24 c. c., 5—15 c. c.

B.—The conditions and general outcome of a similar experiment in this series are shown in Table II.

TABLE II.

BOTTLE	LIQUIDS INVOLVED.				RESULT
	INSIDE		OUTSIDE		
	Ether solution of ferric sulfocyanate	Alcohol	Water	Ether	
No.	c. c.	c. c.	c. c.	c. c.	Dialysis of sulfocyanate 24 hours
1.....	22	15	27	60	+
2.....	27	15	22	60	+
3.....	33	15	16	60	+
4.....	40	15	9	60	+
5.....	55 ^a	15	4	60	+

³By mistake 55 c.c. were taken instead of 45 c.c. The error was not discovered in time for proper correction.

This experiment was started shortly before noon on Feb. 18. At the outset there were layers of water in each bag except the one in bottle 5 (in diminishing volumes from 1 to 4 inclusive). By 2.30 P. M. diffusion of sulfocyanate had occurred in bottles 2 to 5 inclusive, and the volume of liquid in each bag had been materially increased, *especially* in 5. At 6.15 P. M. all these effects were more marked and some diffusion of sulfocyanate had occurred in bottle 1. At this time the volume in the bag in bottle 1 seemed to be the largest. At 2.45 P. M. on the following day (Feb. 19), when the experiment was discontinued, the red color of the diffusate was weakest in 1 and strongest in 5; and the water layers (bags 1-4) bore approximately their original quantitative relations.⁴

The volumes of the internal liquids were measured with the following results: 1—78 c. c., 2—79 c. c., 3—83 c. c., 4—77 c. c., 5—90 c. c.⁵

Similar results were obtained in additional experiments of this kind, the conditions of the most significant of these experiments being given in Table III.

TABLE III.

BOTTLE	LIQUIDS INVOLVED.				RESULTS					
	— INSIDE —		OUTSIDE		Dialysis of sulfocyanate					
	Ether solution of ferric sulfocyanate	Alcohol	Water	Ether						
No.	c. c.	c. c.	c. c.	c. c.	24	48	72	96	120	
1.....	15	13	5	50	—	—	—	—	+	
2.....	20	12	5	50	—	—	+			
3.....	25	12	5	50	—	+				
4.....	30	12	5	50	+					
5.....	35	13	5	50	+					

Watery liquid promptly stratified at the bottom of the bag in each case. It was greatest in quantity in bag 1 and least in bag 5. The usual imbibition results were obtained. (See page 296 for remarks on the distintegration of the rubber in this and similar experiments).

⁴ There were no water layers in the external liquids.

⁵ See the foot note on page 293.

THIRD SERIES OF DIFFUSION EXPERIMENTS.—*On the diffusibility of ferric sulfocyanate through rubber from saliva-acid-ferric chlorid mixtures in the presence of alcohol.* The results of the second series of experiments suggested that the quantitative separation of sulfocyanate from ether-alcohol-water mixtures could not be conducted satisfactorily under conditions of the kind that prevailed in the mixtures, but before accepting this indication as conclusive, analogous experiments were performed with saliva.

These experiments were similar to those in the second series, but instead of using *concentrated* ethereal solutions of ferric sulfocyanate in the tests, we treated saliva with hydrochloric acid and ferric chlorid solutions in the usual way for the development of the classical salivary sulfocyanate reaction and employed this mixture in the diffusion tests. Thus far in our efforts in this direction we have not been able to hit upon a combination of this liquid with alcohol and ether which, when suspended in a rubber bag immersed in ether, will yield satisfactory dialysis results for sulfocyanate. Whether it is *impossible* to effect such a combination, or whether we have merely failed to perfect it, cannot be determined from the few results we have thus far obtained. Further attention will be given to this matter.

FOURTH SERIES OF DIFFUSION EXPERIMENTS.—The data summarized in table III show that less satisfactory diffusion results than those of the preceding experiments are obtained when alcohol or water replace ether *outside* the bag.

TABLE IV.

BOTTLE	LIQUIDS INVOLVED.				RESULT
	INSIDE		OUTSIDE		
	Ether solution of ferric sulfocyanate	Alcohol	Water	15 c. c.		Dialysis of sulfocyanate
No.	c. c.	c. c.	c. c.		24 hours
A-1.....	15	—	—	Alcohol	+
2.....	8	8	—	Alcohol	—
3.....	5	5	5	Alcohol	—
B-1.....	15	—	—	Water	—
2.....	8	8	—	Ether	+
3.....	5	5	5	Ether	—

The dialysis in bottle A-1 was very much less than that which occurs under similar conditions with ether replacing the external alcohol. The volume of liquid in the bag in bottle B-3 increased steadily from the beginning of the experiment.

DECOMPOSITION OF THE RUBBER MEMBRANE THROUGH THE INFLUENCE OF ETHEREAL SOLUTION OF FERRIC SULFOCYANATE.—One of the first of the experiments which was practically identical in its conditions with those shown in Table III, was allowed to continue for about 10 days. At the expiration of that period all the bags except the one in bottle 1 rapidly disintegrated. The latter was very weak, however, on the tenth day. The one in bottle 5 (containing most iron) dissolved away first. Repetitions of the experiments gave the same results when ferric sulfocyanate was present, but no such effects were seen when the same liquids, *free from ferric sulfocyanate*, were used.

That the rubber may be combined with or chemically modified by ferric sulfocyanate in such experiments is strongly suggested by these results. If work directly on this point shows that such is the case, a further obstacle will be put in the way of successful development of the method we hoped to devise.

PROSPECTIVE EXPERIMENTS WITH SALIVARY SULFOCYANATE IN THE ABSENCE OF WATER—The foregoing results emphasize the difficulties which water places in the way of successful attainment of our purpose. We are planning to perform experiments with *desiccated* specimens of saliva, in order to ascertain whether preliminary removal of water may be as advantageous as it would appear to be.

DIFFUSION EXPERIMENTS WITH SULFOCYANATE IN THE PRESENCE OF DI-ACETIC ACID may throw more light on these general questions and we hope to report the results of such work at an early date.

III. GENERAL CONCLUSIONS.

Efforts to separate ferric sulfocyanate *quantitatively* from saliva-acid-ferric chlorid mixtures with ether or alcohol-ether, by dialysis through rubber membranes, have been completely negative.

It is probable that iron combines with or chemically modifies rubber under the conditions of some, perhaps all, of the diffusion tests we have described.

Experiments on the quantitative diffusibility of ferric sulfocyanate from an ether extract of dried saliva-acid-ferric chlorid mixture must be performed before these negative results can be regarded as decisive.

THE ORAL MICRO-ORGANISMS: A BACTERIO-CHEMICAL STUDY OF DENTAL CARIES.*

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I. HISTORICAL REVIEW.

Dental caries is one of the most commonly occurring of all diseases. Its ravages are seen in mouths of persons who are very particular in every point of personal cleanliness and oral hygiene, while perfect immunity is often found in mouths of those who pay little or no attention to keeping the oral cavity in a clean and antiseptic condition. The cause has been sought in the chemical composition of the saliva, and the presence or absence of sulfocyanate, for instance, have been held by many to give immunity or lead to decay as the case might be. Dosage with potassium sulfocyanate has even been widely advocated to bring about a condition of immunity to decay.

Many interesting and important theories (1) have been advanced regarding the causative factors of dental disease. The stagnation of depraved juices in the teeth was first designated by Hippocrates in 456 B. C. as the cause of toothache. This theory was held for many centuries, in fact up to the end of the eighteenth century. Galen in 131 A. D. attributed the cause of decay to disturbances of nutrition and loosening of teeth to an "excess of moisture which impairs the nerves." By many writers up to recent times tooth decay has been regarded as a process of inflammation, but the advocates of this theory ignore many facts completely, such as the decay of pulpless teeth and dead teeth worn on plates. The operation of filling teeth is itself an argument against this theory, as no inflammatory process is set up in boring into the structure.

*Read before the New York Institute of Stomatology, May 2, 1911, at the New York Academy of Medicine. This is the fourth paper relating to studies of dental caries, which Dr. Gies is directing under the auspices of the New York Institute of Stomatology. The previous papers were published in this Journal: (1) Lothrop and Gies, 1910, v, p. 262; (2) Lothrop and Gies, 1911, vi, p. 65; (3) Baker and Gies, 1911, vi, p. 289.

Worms have been regarded as an essential factor in the origin of decay and Chinese dentists have evolved a scheme for making the superstition that worms are the cause of toothache pay among the lower class of ignorant people. In treating toothache "they are in the habit of making an incision into the gum to let the worms out. For this purpose they employ an instrument which has a hollow handle filled with artificial worms. When the incision is made the operator, by a dexterous turn of the instrument, drops the worms into the mouth; the excitement of the patient and the loss of blood cause at least a temporary relief. The worms are collected, dried and are then ready to be taken out of the next patient's gums."

Putrefaction has also been regarded as the cause of decay, although not generally accepted. The chemical theory of caries has had a very large number of distinguished advocates, who believed that it was caused by acids formed by fermentation going on in the mouth, but in this instance only the decalcification of the enamel is accounted for, which leaves unexplained the liquifaction of the matrix and the formation of cavities in the dentine.

A theory, which is more of a curiosity than a theory of decay, is the electrical notion of Bridgeman, presented to the Odontological Society of Great Britain in 1861. His essay won the prize offered for the best treatise on dental decay. He regarded the human mouth as a galvanic battery; the individual teeth representing the different elements and the secretions being a common electrolyte. The electric current generated between the two parts produced an electrolytic decomposition of the mouth fluids and the acids formed caused decalcification.

Caries has been interpreted (2) as an infectious disease working its way outward from within. The idea has also been presented that ptyalin performs an important role, in that it forms acid from the sugar derived from starch. In this case we have the untenable view of the destruction of tissue by an enzyme in the secretion which normally bathes it, as would be the case in auto digestion of the stomach by pepsin. It has been claimed (3) also, that caries results solely from the action of mucin upon the teeth which is liberated from its salts by the presence of some weak acid.

Sim Wallace (4) in his book, "The Cause of Decay in Teeth," holds that "the cause of the prevalence of dental caries is that the natural food stuffs are to a large extent riddled of their accompanying fibrous parts and consequently in mastication the teeth are not cleansed by fibrous elements of the food."

The popular idea that difference in the physical qualities of the teeth such as the percentage of lime salts account for the phenomena of decay was disproved by Black (5) in a very exhaustive and careful investigation on the physical character of teeth. He found that differences in percentage of lime salts has no influence as to the liability to caries and that the active cause is a thing apart acting from without. The cause of caries is not dependent upon any conditions of tissues of the teeth, but on conditions of their environment and imperfections are causes only in the sense of giving opportunity for the action of causes that induce caries. His conclusions have not been generally accepted and there are still many (6) who believe that deficiency of lime salts is a very important factor.

The parasitic theory of dental caries, which is the generally accepted theory at the present time, was placed upon a firm foundation by the brilliant researches of Dr. W. D. Miller. He demonstrated that decay is brought about through the agency of micro-organisms present in the oral cavity, which produce acids by the fermentation of carbohydrate material. The bacteria also secrete proteolytic enzymes, which destroy the dentine after the calcium salts have been dissolved out by the acid. Miller was successful in artificially producing caries of the teeth which could not be distinguished from natural decay. "His work on the etiology of dental caries is a classic. * * * It was this work which at once brought him into prominence before the scientific world and secured him a position among investigators of the first rank with a status in the dental profession equivalent to that enjoyed by Pasteur and Koch in medical science." (7.)

The Dutch scientist, Leeuwenhoek, (8) was the first to discover the presence of microscopically small organisms in the human mouth (1683), and was able to describe several, among which was the motile *Spirillum sputugenum* now so well known. Prof. Erdl (9) was probably the first to accuse micro-organisms of being concerned in the production of decay (1843), although

the credit is usually given to the Dresden physician, Ficinus, (1845) who described organisms which he called "denticolae," which on decomposition attacked the enamel, and after thus gaining entrance caused the destruction of the dentine. Leber and Rottenstein (9) in 1867 further advanced the parasitic theory, although they combined it with the purely chemical idea of the commencement of decay. They held that after the enamel and dentine had become partially decalcified an organism called *Lep-tothrix buccalis* worked its way into the tubules, distending them and making the way clear for the further action of acid. They also tried to produce decay artificially by placing teeth in a mixture of common food products, which putrefied and became alkaline so that no caries was produced. They did not realize the necessity of acid fermentation to begin the tooth destruction, and, as their results were negative, concluded that the action was not due to bacterial growth.

The next contribution of importance was made by Miller and Underwood (9) (1881), who rejected the chemical theory and advanced the idea that the acids causing destruction were secreted by the germs themselves which they always found present. This was a great step in advance as it for the first time definitely accounted for the source of the acid. Interest was revived by their contribution which stimulated many workers, and during the next decade a large amount of research was done upon this important question begun by Dr. Miller and followed by many other workers.

The mouth presents an ideal habitation for bacteria, which are the most widespread of living things, and it is not surprising that a very large number of different kinds of bacteria have been found in the mouth under all sorts of conditions. There are a few varieties which are met with only in the mouth and which will not grow outside on any culture medium so far devised. Others, such as the *Bacillus coli communis* normally present in large numbers in the intestines of animals, have been isolated from the mouth frequently. Bacteria are very sensitive to their surroundings and often are killed by the products of their own growth. For instance, acid producing bacteria will develop only a certain concentration of acid in the media unless some substance is added to neutralize the acid as fast

as it is formed. Someone with a genius for mathematical possibilities has estimated that a single bacillus which reproduces itself by binary fission once every half hour, will in two days have developed 281 billion bacteria, occupying a volume of half a liter, which in three days more would produce a mass sufficient to fill the beds of all the oceans on the globe, the number being represented by 37 places of figures. No such development, of course, takes place on account of the lack of nourishment, sensitiveness of the bacteria to their environment, and other reasons. Many products are formed as a result of bacterial activity, among which may be mentioned gases, acid and alkali, heat, phosphorescence, pigments, and many kinds of enzymes. Many pathogenic bacteria form poisons or toxins and the symptoms of the disease are due to the absorption of these poisons.

The constant presence of bacteria in the air makes it necessary that all materials used be freed from organisms naturally present, for, unless this is done, it is not possible to determine whether the colonies that develop come from the materials used or from the substances used for inoculation. The most important single item in bacteriological technique is the necessity of obtaining pure cultures of organisms under investigation, and it is often very difficult to obtain the desired results, owing to the ease with which some species of bacteria outgrow and overrun others. This is especially true of the mouth bacteria, many of which it is very hard to grow on artificial media. While a small colony may develop some other more prolific species quickly spreads over the whole surface and destroys the weaker species. A gelatin or agar plate exposed to the air for a very short time will develop colonies when incubated, and there are everywhere present organisms ready to develop when favorable conditions present themselves. In the study and description of bacteria it is very important for future workers that standard media be used and that full and detailed description of the growth of a species in the commonly used media be given.

In discussing the oral micro-organisms it might be well to consider first, some of the pathogenic organisms that have been isolated; second, bacteria found only in the mouth; third, those that have been especially connected with dental caries and other diseases such as pyorrhea and pulp gangrene; and finally, bacteria of infrequent occurrence.

Many pathogenic bacteria have from time to time been obtained from the mouth cavity, sometimes by cultural methods, but preferably from animals inoculated with saliva. That human saliva under certain circumstances may have poisonous effects has been known for many centuries. Aristotle referred to a girl whose bite was as poisonous as a snake bite. Of course the earlier writers did not associate the poisoning caused by the injection of saliva with the presence of bacteria, but considered it due to some poisonous constituent, for example, Eberle (10) attributed it to sulfocyanate and thought he was able to detect an increase in the sulfocyanate content during fits of anger. In 1881 two French workers (11) injected rabbits with saliva from a child suffering from hydrophobia. The rabbits succumbed and the poisoning was referred by them to the presence of micro-organisms, although the disease produced was probably septicæmia, surely not hydrophobia, as it proved fatal in 48 hours. Various investigations have proved beyond doubt that there are organisms invariably present in the mouth that will cause severe infection if injected into the circulation of animals in sufficient numbers.

As on every question relating to diseased conditions of the mouth we find extensive work by Miller (12) on the pathogenic bacteria. In 1891 he published an article containing a list of 38 diseases directly traceable to germs growing in the mouth, with a tabulation of 149 cases. The germs reached the circulation in most cases through decayed teeth and occasionally through wounds made by instruments. At the same time he described completely and in detail the most common of the pathogenic bacteria and mentioned many rare ones, twenty-three in all. Biondi (13) also made a valuable contribution to the knowledge of the pathogenic bacteria. Kenneth W. Goadby (14) in his book "The Mycology of the Mouth," has written a very complete chapter on the "Pathogenic Bacteria of the Mouth."

Among the pathogenic disease-producing organisms perhaps the most common is the pneumococcus, the diplococcus of pneumonia. Natural resistance ordinarily keeps the organism from obtaining the upper hand, but it develops frequently associated with other diseases, and after exposure when vitality has been greatly reduced. These cocci are constantly present in the air

and in many mouths, but it is very difficult to cultivate it directly from the saliva and its presence is usually shown by inoculating a susceptible animal such as the rabbit with saliva. Thus the neglected oral cavity furnishes a dangerous source of infection to pneumonia. Very virulent pneumococci have been demonstrated in mouths of perfectly healthy individuals, but those isolated differ considerably in their virulence. Cook (15) found the pneumococcus in the mouths of 56 out of 220 school children examined.

Streptococcus pyogenes, the organism associated with erysipelas and pyaemia, and other varieties of pus forming cocci such as the *staphylococcus aureus*, *albus*, and *citreus* are often found in the mouth. There seems to be a difference of opinion as to the occurrence of these pus forming organisms, Netter (16), Vignal (17), and Miller (18) having found them only occasionally, while Black (19) believes them to be present in the majority of cases, having found the *S. aureus* in seven out of ten healthy mouths examined. Goadby reports finding it in about 10 per cent. of the cases examined (1,000 mouths). Miller admits that he never paid particular attention to these organisms. Sanarelli (20) claims that the saliva has bactericidal power for the *S. aureus*, but this power is quantitative and insufficient to deal with large numbers. *Micrococcus tetragenous* is often present in normal saliva and in dento-alveolar abscesses, and was first studied by Koch who found it in tubercular persons. It is peculiar in that the cocci are arranged in groups of four. It has been isolated by Miller, Biondi (13) and others.

The Klebs-Loeffler or bacillus of diphtheria occurs in the mouth more frequently than is usually recognized by dentists, and may be transferred from mouth to mouth without causing the disease until it reaches a susceptible individual, who succumbs to the infection. Its presence has been shown in the mouths of about 33 per cent. of those who have been exposed to infection and in one investigation virulent bacilli were found in 41.5 per cent. out of 214 persons who had been exposed. Cook (21) found the diphtheria bacillus in 14 out of 186 mouths examined.

Another very common disease which may gain a foothold through lesions in the mouth is tuberculosis. It is often difficult

to demonstrate the presence of the tubercle bacillus in the saliva of persons known to be suffering from the disease, but the work of Cook (21) who investigated the mouths of 220 persons with special reference to this organism, points to the conclusion that the pulp canals often become tuberculous and are a ready means of glandular infection. Carious teeth provide a point of lowered resistance in the form of inflamed tissue where the organisms eventually gain a foothold.

There are many recorded cases of syphilis which have been transmitted by means of saliva or instruments used in the mouth of patients suffering from that disease and from transplantation of teeth which were not properly sterilized. Among the other pathogenic bacteria may be mentioned the *Bacillus pyocyaneus*, the bacillus of "blue pus," so named because of the pigments produced. It occurs occasionally. A disease of cattle, actinomycosis, has been transmitted to man, the organism, *Streptothrix actinomyces*, gaining access through a carious tooth or an injury to the mucous membrane. Miller (22) describes four organisms, which he found occasionally present in unhealthy mouths, which were pathogenic for mice. These he named *Bacillus gingivae pyogenes*, *Bacillus dentalis viridans*, *Bacillus pulpae pyogenes*, and *Micrococcus gingivae pyogenes*.

Many other cases are on record of diseases that could be traced to infection in the mouth, but those already cited are sufficient to indicate the necessity on the part of dentists of exercising great care in the matter of liberal use of antiseptics and the thorough sterilization of instruments.

A very interesting group of bacteria have been isolated which are very frequently present and occur only in the mouth, some of which have not as yet been cultivated on laboratory media. Miller (23) classified these organisms as follows: *Leptothrix in-nominata*, *Leptothrix buccalis maxima*, *Bacillus buccalis maximus*, *Spirillum sputugenum*, *Spirochaete dentium*, and *Iodo coccus vaginatus*. To these may be added the *Leptothrix racemosa* of Vicentini (24) and the *Streptothrix buccalis* of Goadby (25). Some of these organisms belong to the group of higher bacteria, thread forming organisms. Some give the so-called granulose reaction, that is, they are stained blue by treatment with acid iodine solution. These are the *Bacillus buccalis maximus* and *Iodo coccus*

vaginatus. A few other organisms also give the iodine reaction but have been isolated only rarely and not definitely studied. Of the uncultivable bacteria described by Miller, Goadby (26) has been able to cultivate two, the *Bacillus maximus* and the *Spirillum sputugenum*. The former was grown on a special maltose-agar or potato-gelatin media and after once acclimated to artificial media it is hardy and can be grown on the other commonly employed nutrient materials. This is the largest of the mouth bacteria and occurs for the most part in dirty mouths. It is a motile bacillus forming spores. The *Spirillum sputugenum* is often called the comma bacillus on account of the comma shaped rods occurring in young cultures. In old cultures it shows the typical spirillum form. It is a very difficult organism to cultivate and at first grows only to a very limited degree on specially prepared media. The *Spirochaete dentium* of Miller is probably identical with the spirillum. A branching organism isolated by Goadby belonging to the genus *Streptothrix* was found by him in pyorrhea pus, but never in a healthy mouth.

The most interesting organism of this group is the *Leptothrix recemosa*, first described by Vincentini (24) who at first considered it the origin of all the bacteria found in the oral cavity but modified his view later, although still maintaining that many forms are different phases of this organism. It is found in the majority of mouths and is especially abundant where little care is taken to insure oral cleanliness. Special methods are necessary to preserve the various forms intact for microscopic examination and glycerol has been found to be the most satisfactory mountant. This organism probably belongs among the group of Fungi and shows a mass of threads with "fruitful heads" much resembling spores. A full description of this organism has been given by Williams (27).

The bacteria of decay produce their effect in two ways: first, acid is produced by fermentation which attacks the inorganic salts of the tooth abstracting the calcium, and second, proteolytic enzymes are formed which liquify and digest the organic constituents of dentine after removal of the lime salts. Miller (28) showed this process experimentally by producing artificial caries which could not be distinguished under the microscope from natural decay.

The formation of the "bacterial plaque" under which bacteria develop freely and carry on their work of destruction is a phenomenon familiar to all dentists. Authors differ as to whether its presence is essential. To quote: "Caries of the teeth has its beginnings when the conditions of the mouth are such that micro-organisms causing caries form gelatinous plaques, by which they are glued to the surface of the teeth" (Black). Miller (29) claimed that bacteria are not glue makers, as that would prevent access of food. The film represents a growth in or upon enamel cuticle and is not mechanically attached to the enamel itself. On dentine they are attached directly and mechanically. They form wherever the surface of the tooth is not kept free from mucous, epithelium, food, etc., and are often present on teeth showing absolutely no trace of caries. They generally accompany the carious process but not always, and do not necessarily give rise to caries. Again he writes: "Bacterial plaques are *essential* neither to the beginning nor progress of caries, nor does their presence necessarily result in its production. They may intensify the process of decomposition in food particles clinging to tooth surfaces" (30). Goadby (31) has frequently demonstrated plaque formation artificially.

All investigators agree that caries is not a disease due to a special micro-organism, but that any bacteria which produce acids can prepare the tooth for the further action of proteolytic enzymes that destroy the matrix. The bacteria found in the superficial layers of dentine are both acid producers and liquifiers, while those found in the deeper layers are acid producers only. Hard undecalcified dentine is not effected by enzymes unless first acted upon by acids. Goadby (32) considers that the organisms present in caries are fairly constant and classifies them according to the scheme on the opposite page.

It is noticeable that the liquifying bacteria belong to the class of bacilli while the acid forming organisms with one exception are cocci.

Of the above mentioned organisms by far the most commonly occurrent is the *Streptococcus brevis* (the micrococcus nexifer of Miller (33)) which occurs in practically every mouth and is often the only organism found in a healthy mouth. Goad-

by (34) reports that he has never failed to find it and that it is also by no means confined to the human mouth but has been observed in monkeys, dogs, rabbits and guinea-pigs. It grows very rapidly in almost all media to the exclusion of other organisms. It differs from the ordinary streptococcus form in that it occurs usually around epithelial cells as diplococci, rarely in chains. It produces a strong acid reaction in carbohydrate media, and is not pathogenic when injected subcutaneously or intraperitoneally. The streptococcus is more frequent in the mouths of children than in adults (35).

ACID FORMING BACTERIA.

Deep layers of carious dentine.

Streptococcus brevis
Bacillus necrodentalis
Staphylococcus albus

Superficial layers.

Streptococcus brevis
Sarcina lutea
Sarcina aurantiaca
Sarcina alba
Staphylococcus albus
" aureus

BACTERIA WHICH LIQUIFY DECALCIFIED DENTINE.

None isolated from deep layers of dentine.

Superficial layers.

Bacillus mesentericus ruber
" " vulgatus
" " fuscus
" " furvus
" gingivae pyogenes
" liquefasciens fluorescens motilis
" subtilis
" plexiformis
Proteus Zenkeri

The *Bacillus subtilis* is the common hay bacillus found in soil and abundantly on hay and is a very large bacillus much resembling the deadly anthrax. It is motile and forms spores and is very sensitive to acids. Two of the organisms, *Bacillus necro dentalis* and *plexiformis* are new species isolated and named by Goadby (36). Vignal (37) in 1886 isolated seventeen kinds of bacteria, which he obtained in pure culture, which he designated for the most part by letters. Many of these have later been identified with well known species. Choquet (38) described five organisms isolated from carious dentine but used special media only, so that their identification with known species is impossible. Black (39) has described a gelatin-forming coccus which perfectly gelatinized 2 per cent. sugar-peptone broth in 24 hours. It was found far back on the dorsum of the tongue and occasionally scattered throughout the mouth. It was a difficult organism to keep alive. Goadby (40) also often encountered a series of bacteria which formed tough gelatinous colonies on media entirely free from carbohydrate. One species he has named *Staphylococcus viscosus*. Its growth on agar was extremely viscous and the whole mass could be wound up on a platinum needle. Miller (41) has also described a pathogenic yeast fungus and others have met with various species of fungi in the oral cavity. It has been claimed (42) that the bacteria found in children's mouths are more virulent than those in adult mouths.

Excellent results have been reported (43) in the treatment of rampant caries by crowding out acid producing organisms. This was accomplished by sowing in the mouth spores of the *Bacillus mesentericus vulgatus* which does not ferment carbohydrates, but tends to produce an alkaline reaction and by-products inimical to acid producers.

In investigating the bacteriology of pulp gangrene, Arkövy (44) found present in 95 per cent. of the cases examined an organism which he called *Bacillus gangrene pulpaе*. Associated with it he found the *Staphylococcus aureus* in 34 per cent. of the pulps, *Streptococcus pyogenes* in 23 per cent., and other varieties in a smaller number of cases. Cook (45) isolated the same organism in 34 out of 40 cases examined, but found it always associated with other bacteria, so that it is certain that

no one micro-organism is wholly concerned in the causation of the disease. Sieberth (46) and Goadby (47) on the other hand, were not able to isolate the bacillus of Arkövy and believe that it corresponds to one of the bacilli of the Mesentericus group. Miller (48) examined 250 tooth pulps and constantly met with pathogenic cocci which he considered the organisms most concerned in pulp destruction. Masses of putrid pulp inoculated into animals caused tissue necrosis and death in three or four days. Many of the organisms found in carious teeth naturally find their way into the pulp chamber and have thus been often found in cases of pulp gangrene.

A large number of bacteria are found in the pus of pyorrhea, but so far great difficulty has been encountered in obtaining pure cultures of the organisms seen in cover slip preparations. Galippe (49) isolated two species which produced general abscess formation when injected into animals. One organism produced abscesses in the joints and the other intramuscular lesions. Investigators agree in regard to the infrequency in which the common pus cocci are found in pyorrheal pus. In 43 cases Miller found the *S. aureus* but three times and the *S. albus* twice, while Goadby (50) found them present to the extent of exactly 10 per cent. in 150 cases examined. Arkövy (51) found what he considered phase forms of the *Leptothrix racemosa* in cases of pyorrhea. Certain facts point to the presence of a toxic element in pyorrhea, although it is not possible to associate any definitely isolated bacterium with this disease. The products of the growth of the organisms in pyorrhea are extremely pathogenic for animals and the health of persons suffering from this disease is undoubtedly seriously affected by the continual swallowing of these organisms and their products. Some individuals with toxic mouth conditions show no signs of poisoning and there may be an antitoxin formation which creates a condition of tolerance. Treatment of acute pyorrhea through the use of specific vaccines has met with some success (52).

Among other bacteria found in the oral cavity by various workers which have not been referred to might be mentioned the *B. coli communis* (a very widely distributed organism), the Hoffmann's bacillus (pseudo-diphtheria), *B. Friedlander* (pneumo bacillus), *B. influenzae*, *B. luteus*, *B. buccalis minutus*

(Vignal g.), *B buccalis fortuitus* (Vignal j), *Bacillus B* of Vignal, *Bacillus G* of Vignal, *Micrococcus roseus*, and *Vibrio Finkler-Prior*.

The same bacteria are found in immune and rapidly decaying mouths and will grow readily in the saliva of either. Black (53) holds that susceptibility or immunity is not related to any question of antiseptics but it is in some degree probably related to a development of antitoxins, although different in many respects. After an exhaustive study of the question of immunity Miller (54) arrived at the following conclusions: Mixed human saliva does not possess the power to prevent or retard processes of fermentation or putrefaction and has no bactericidal power. Potassium sulfocyanate does not possess appreciable antiseptic action in the greatest concentrations ever met with in the mouth. The saliva of immunes develops in the presence of carbohydrates on an average a little less acid than that of susceptibles, but the difference is not sufficiently marked to account for the marked differences in susceptibility. The protective bodies in the blood do not pass into the saliva in sufficient quantity to be detected by ordinary means. The struggle for existence probably performs an important role against the invasion of the pathogenic micro-organisms and in restricting the growth of mouth bacteria. Miller (55) also found a more rapid development of bacteria in fluid particles impregnated with alkaline saliva with a final production of slightly more acid than when the saliva is acid to begin with. The character of the food has a great influence and tooth structure is an important factor. The action of viscosity of saliva as a causative factor has been somewhat overrated.

In regard to the comparative number of bacteria in different mouths figures obtained by Miller are of interest.

No. of bacteria per loop of saliva:

	AVERAGE.	EXTREME.
Immune	65,000	15,000 to 95,000
Slight caries.....	34,000	18,000 to 50,000
Moderate caries.....	62,000	31,000 to 95,000
Highly susceptible.....	56,000	41,000 to 84,000

A very large number of experiments are necessary to arrive at any definite conclusions as to the relative number of bacteria present.

Kirk (56) believes that immunity to caries is dependent upon the absence from saliva of the kind and amount of pabulum (absence or insufficiency of carbohydrate material) upon which the bacteria of decay normally thrive.

This brief review of the occurrence and action of some of the oral micro-organisms may serve to show how complicated is the problem of restricting the ravages of the hosts of organisms that inhabit the mouth. It indicates that further advances lie in the direction of the discovery of the causes which lead to the attachment of bacteria upon the teeth and favor their development as well as in a detailed study of the individual oral organisms.

If it could be definitely established what forces are brought to bear in the production and maintenance of immunity, the problem of making decay a disease of rare occurrence would soon be solved. The problem is one of the greatest importance, as it has to do with the welfare and happiness of a great proportion of the human race.

II. EXPERIMENTAL.

"General chemical study of saliva (57) in typical cases of dental caries and in cases of comparative immunity to decay has failed to reveal significant chemical relationships. These negative results have led to the conclusion that if any salivary compounds cause decay, they must occur in saliva in proportions that are too minute at any moment for their chemical detection under the variable conditions of salivary secretion. It also seems probable that if such substances are continuously produced in very slight proportions during a long period of time they may be cumulatively effective and sufficiently corrosive to disintegrate and puncture enamel. Such insidious changes could occur in and under the ordinary viscid and tenacious plaque formations, which, by affording a favorable ground for the lodgment and development of bacteria, might be seats of continuous chemical action by small, perhaps infinitesimal, proportions of bacterially produced enamel destroying compounds (e. g., acids from carbohydrates.)" These convictions have led to the development of a plan (58) of work along bacterio-chemical lines.

The growth and cultivation of the mouth bacteria present unusual difficulties, for many will not grow at all or develop with

great difficulty on artificial media. We have attempted to obtain pure cultures of organisms from the saliva and from decaying teeth, but have been successful in isolating only a few varieties. Through the kindness of Dr. J. Morgan Howe cultures were obtained from several cases of very rapid and destructive decay. Pieces of decaying dentine were transferred with sterile instruments to agar tubes or bouillon and a rapid growth of bacteria was observed after incubation. Streak cultures were made from different colonies, and we were able to obtain pure cultures of a few of the organisms, but the process of identification requires growth on a very large number of different media and is a difficult matter. There is a great tendency for one species to outlive most of the others. There has been generally observed the *Streptococcus brevis*, found by Goadby (34) in all mouths, and we have frequently seen a coccus producing an orange-yellow pigment, and liquifying gelatin, probably *Staphylococcus aureus*. A short bacillus showing a bluish-green fluorescence by transmitted light was isolated from a piece of badly decayed dentine. One very interesting organism obtained in pure culture from the mouth of an Irish girl, whose teeth were fairly dissolving away, appeared to be a yeast fungus, showing the typical budding characteristic of yeast organisms. This fungus was also observed in a culture from another case of rapid decay.

We were very fortunate in being able to take cultures at two different times from the teeth and saliva of Miss D., the young lady who made it possible for us last year to study thoroughly and report upon saliva from a case of perfect immunity (59). She furnished for that work over forty samples of saliva, which made possible a series of results of the utmost importance. The cultures from the teeth were obtained by scraping along the gum margin with a sterile platinum wire and planting the material in agar tubes. Bouillon tubes were inoculated with saliva. The agar tubes showed the presence of only two varieties of cultivable organisms, a coccus producing an orange-yellow pigment and a second, probably the *Streptococcus brevis*.

Cover slip preparations from bouillon cultures have shown the presence of the thread forming organisms and other varieties already mentioned, but they were found only in mixed cultures.

In preparations from teeth scrapings many of the bacteria already described were observed.

The exceptional difficulties in isolating pure cultures of mouth bacteria made it seem best, in this preliminary work, to resort to the use of mixed cultures for observations of growth in various media. We have already expressed the opinion that mucin is an important factor in decay, and we have tried the use of mucin solutions as nutrient media. It is a matter of considerable difficulty to obtain an abundance of mucin, as it is present in saliva in small proportions. The solutions were prepared as follows: The available supply of saliva was poured into four volumes of alcohol and the precipitate allowed to settle. The solid matter was filtered off and the alcohol removed as thoroughly as possible by pressing between filter papers. The product was dissolved as completely as possible in water by warming at 38°, about half the volume of the original saliva being used for the solution. To half was added glucose (1%) and all was tubed and sterilized as usual. Growth was not abundant in the mucin solutions but good growth with acid production was frequently observed in the glucose-mucin solution when inoculated with bacteria from decaying teeth and also immune mouths.

We have also studied the growth of bacteria from cultures from immune mouths and decaying teeth, in maltose and glucose broth. The results obtained show that there is acid production regardless of the condition of the mouth and teeth of the individual from whom the culture was taken. Typical figures are interesting:

	c.c. n/50 NaOH per 5 c.c. 1% glucose broth.
Immune mouth.....	10.1
Slight decay.....	8.0
Bad decay.....	13.4

When maltose broth was used the amount of acid formed was usually a little less than with glucose. Our observations are in accord with Miller's (30) conclusions in this connection.

The solvent action of acids formed by bacterial action on naturally extracted teeth has been investigated. Do the bacteria from bad cases of decay form products that will dissolve away more lime salts than the bacteria from healthy and immune mouths? A number of very fine teeth, showing practically no

decay, which had been removed, not for any defects, but to make room for other teeth, were kindly given us by Dr. James F. Hasbrouck. In order that we might be able to state positively that the enamel surface was in a perfect condition, these teeth were submitted to Dr. Howe for critical examination that any pin-hole cavities or abrasions might be detected by one who was thoroughly acquainted with such imperfections. Any holes or fissures found were carefully drilled out as in preparation for filling and definite cavities were produced which were then filled with wax. The roots were then covered and embedded in wax leaving only perfect enamel exposed. The teeth were kept in a 50% glycerol solution until used.

Twenty-five cubic centimeter portions of 2% glucose, maltose, or dextrin bouillon in small flasks (100 c.c.) were inoculated and a tooth placed in each flask, which were then incubated at 37.5° for several weeks, being shaken at intervals. After from five to six weeks' incubation, the flasks were sterilized by heating in an Arnold sterilizer for one-half hour. The liquid was filtered, 5 c.c. of 10% acetic acid solution added and the mixture heated on a steam bath for some time to flocculate the bacteria. The liquid was then filtered, 10 c.c. of 10% NH_4OH solution added and finally made slightly acid with acetic acid. The calcium was precipitated in the usual manner with ammonium oxalate and the oxalate titrated with $n/20$ KMnO_4 in H_2SO_4 solution. A blank determination of the calcium in the broth showed only a trace.

An examination of the figures given in Table I shows that calcium is extracted by the products of the growth of bacteria from immune as well as decaying mouths just as acid production in sugar broth was observed in both cases. In the case of Miss D. the original cultures (Nos. 8-11 and No. 22) were taken at different times and the difference in the amount of calcium extracted seems to indicate that the bacterial inhabitants in the same mouth vary both in kind and numbers at different times, as might be expected. Glucose broth appears to be the most favorable medium for abundant acid production and consequent calcium extraction.

TABLE I.

Data pertaining to experiments on the solution of calcium from natural extracted teeth.

Decay.	Culture No.	Time of incubation. Weeks	Culture medium and the amounts of calcium (as oxide) dissolved by it.			
			2% Maltose Broth CaO mg.	2% Glucose Broth CaO mg.	2% Dextrin Broth CaO mg.	
	4	6 ½	3.5	...	...
	4	6 ½	...	...	6.4	(10 cc. glucose.) (10 cc. maltose.) (5 cc. dextrin.)
	4	5	...	12.1	...	
	5	6 ½	...	29.3	...	
	12	5	3.8	...	...
	19	6 ½	..	...	4.0	
	19	6 ½	74.3	...	...	(cracked tooth.)
	19	6 ½	...	32.0	...	
	3	6 ½	...	...	0.0	(cracked tooth.)
	3	5	...	21.4	...	
	13	6 ½	14.8	...	...	(cracked tooth.)
	13	6 ½	...	4.5	...	
	14	6 ½	...	2.6	...	
	20	6 ½	28.8	...	...
	21	6 ½	...	24.2	...	
Immunity.						
	7	5	...	28.5	...	
	15	5	2.9	...	...
	8	5	...	...	13.6	
	18	5	...	51.2	...	
Miss D.						
	8	5	2.3	...	...
	10	6 ½	10.0	...	...
	11	6 ½	...	13.4	...	(cracked tooth.)
10 & 11	5		...	30.2	...	
	22	6 ½	...	2.4	...	
	22	6 ½	...	...	2.0	

The presence of bacterial plaques on the surfaces of decaying teeth has long been noticed by dentists and many attempts have been made to produce these plaques or something resembling them artificially and also to discover if possible the nature of the substance. As early as 1887 Black called attention to these plaques and later devised the so-called "lamb-broth method" of producing them. More recently he (60) has described what he calls a "plaque" as a substance that is gelatinoid or gelatin-like but not gelatin, not soluble or meltable as gelatin but very much resembling it in appearance. Black believes that it is formed by the same micro-organisms that produce the acid which causes caries, and that its formation depends upon some peculiar condition of the saliva at the time.

The Research Committee of the New York State Dental Society (61) have reported certain results obtained in this laboratory by Miss Seaman and Dr. Gies along this line, using the so-called "lamb-broth method." It seemed desirable to study further in this connection the formation of plaques by bacteria grown in this medium. A young lamb, nine days old, was delivered alive at the laboratory.

The animal was bled to death under ether anesthesia. The muscle and flesh were dissected away as completely as possible and a little over a pound obtained. After maceration in a hashing machine the hash was extracted over night with tap water saturated with CaCO_3 . The extract was strained through cheese cloth and then heated in the sterilizer in the usual manner to remove coagulable material. After filtering several times through paper, the cloudy broth was tubed and sterilized in the usual manner. The only point of departure in this method from that outlined by the Research Committee of the New York State Dental Society (62) was the maceration of the flesh in a hashing machine instead of being bruised with a mallet. Sterilized strips of glass were immersed in the liquid after their inoculation and the growth observed on the glass at the top of the broth. The bacteria grew well in this medium and formed in many cases masses on the strips which, however, were not adhesive and could easily be washed off by shaking the tubes. Microscopic examination of material adhering to the glass revealed colonies of bacteria and

also homogeneous clear masses sticking to the glass that were difficult to describe. Small, white, beadlike masses were also observed but these were not at all adherent to the glass.

Kirk (63) has reported the precipitation of mucin as a single plaque in a mucin-glucose solution made alkaline with Na_2HPO_4 and colored blue with litmus solution, which was reddened by the acid formed. He suggests that the precipitation of mucin by lactic-acid-producing bacteria may be a very important factor in plaque formation on the teeth. We have also stated the substance of this idea in another connection.

In a recent private communication, Dr. Black tells us of new work on plaque formation which has been done under his direction with new methods. This work is soon to be published in the Dental Review. While plaques upon the teeth do not necessarily give rise to caries yet they generally accompany the carious process and it is very important to discover if possible what factors cause their formation. Further investigation especially with salivary mucin is important and will be undertaken.

Frequent prolonged application to the teeth of acids would seem to have a deleterious effect upon them, attacking and decalcifying the exposed parts. However some people who are in the habit of eating strongly acid fruits are particularly free from caries, as for example the Sicilians, who are large consumers of lemons. Goadby (64) suggests "that the acids (in such cases) may act as a protective by preventing the development of acid-forming organisms, or dissolving away the outer layers of the enamel and with it the contained bacteria, secondary dentine occluding the pulp chamber before the process had threatened that cavity." Before we were aware of Goadby's opinions on these points we suggested that fruit acids might be especially useful for the disintegration of plaques by reason of the mucin precipitating power of such acids. (65).

We have determined the solvent action of some of the common fruit juices and fruit acids upon teeth. Acetic acid solution was prepared with the same acidity as that of ordinary vinegar and a citric acid solution corresponded in acidity to the lemon juice. The solutions were titrated with $n/5\text{NaOH}$ solution using phenolphthalein as the indicator. Qualitative examination of

filtered lemon juice showed mere traces of calcium. The teeth were examined and the roots embedded in wax according to the method described on page 314. The cracked teeth were crushed in a mortar into small pieces and one gram used in each case (from 10-20 pieces). Not only the enamel but also the dentine was thus exposed to the action of the acid. The powdered tooth had been thoroughly ground in an iron mortar and sifted through cheese cloth. One gram of the powder was used in each determination. Calcium was precipitated from solution as usual with ammonium oxalate and the oxalate titrated in H_2SO_4 solution with $n/10\text{KMnO}_4$ solution. The amount of calcium extracted in each case is given in Table II. The disintegration of the tooth structure was very decided in each case, the enamel being markedly dissolved even in one day by the action of the acetic acid.

TABLE II.

Data pertaining to the solution of calcium from natural extracted teeth by fruit acids.

Acid Liquid	Volume used c. c.	Period of extraction days	Acidity per 5 c. c. in terms of $n/5$ NaOH	Amount Calcium extracted CaO mg.	
Vinegar	50	5	9.6	37.8	Whole tooth.
Vinegar	50	45	9.6	156.5	Cracked tooth.
Acetic acid	50	1	9.6	18.2	Whole tooth.
Acetic acid	50	5	9.6	80.9	Whole tooth.
Acetic acid	50	5	9.6	113.4	Cracked tooth.
Acetic acid	50	5	9.6	142.2	Powdered tooth.
Acetic acid	50	45	9.6	170.0	Cracked tooth.
Lemon* juice	25	5	20.6	175.3	Whole tooth.
Lemon juice	25	45	20.6	185.3	Cracked tooth.
Citric acid	25	1	20.6	64.4	Whole tooth
Citric acid	25	1	20.6	210.0	Powdered tooth.
Citric acid	25	5	20.6	194.6	Whole tooth.
Citric acid	25	5	20.6	192.3	Tooth, two cavities.
Citric acid	25	5	20.6	203.8	Cracked tooth.
Citric acid	25	5	20.6	217.5	Powdered tooth.
Citric acid	25	45	20.6	174.0	Whole tooth.
Orange* juice	50	45	2.8	70.0	Whole tooth.
Apple* juice	50	45	1.6	45.0	Whole tooth.
Lactic acid (2%)	50	5	5.6	136.6	Whole tooth.
Lactic acid (2%)	50	45	5.6	221.0	Whole tooth.

*CaO in fruits. Bureau of Chemistry, Bulletin No. 66, p. 54.

Apple 0.013%

Orange 0.10.

Lemon 0.15.

III. SUMMARY OF CONCLUSIONS.

1. Isolation of pure cultures of mouth bacteria has been unsuccessful except in a few cases. The cultivation of these bacteria on ordinary laboratory culture media presents unusual difficulties.
2. Production of acid and a consequent precipitation of mucin have been observed in glucose-mucin solutions by the growth

of bacteria from immune as well as badly decaying teeth. The mucin was thrown down as a flocculent precipitate, not in the form of plaques.

3. There is acid production in glucose and maltose broth cultures regardless of the condition of the mouth and teeth of the individual from whom the bacteria are taken.
4. Calcium is dissolved from natural extracted teeth by the products of bacterial growth in sugar bouillon inoculated from cultures of bacteria taken from both immune and diseased mouths. Cultures of bacteria from the mouth of Miss D., a case of perfect immunity, extracted practically as much calcium as any culture from decay cases.
5. Present methods for observing artificial plaque formation are unsatisfactory and further investigation, especially with salivary mucin, is of the utmost importance.
6. Investigation into the chemical and physico-chemical nature of salivary mucin is essential, especially in view of its probable relation to deposits or plaque formations upon the teeth under and in which bacteria are sheltered and where they carry on the destruction of the tooth structure. Preliminary experiments performed in this connection have not been included in this paper because of our desire to investigate the matter further before discussing it.
7. Common fruit juices and fruit acids exert solvent action upon the inorganic substances of natural extracted teeth immersed for comparatively long periods continuously in such liquids. They dissolve away relatively large amounts of calcium under such conditions.

In conclusion the author wishes to acknowledge his indebtedness to Prof. Wm. J. Gies for his counsel and guidance throughout this work.

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ON VARIATIONS IN THE OCCURRENCE OF NITRITE
IN SALIVA.*

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I. INTRODUCTION.

Nitrites are among the constituents of saliva which have been supposed to bear definite relations to dental disease. Salivary nitrite fluctuates markedly in proportion, however, in every individual. Lothrop and Gies have observed the frequent absence of nitrite from specimens of saliva which were collected from subjects immediately after their awakening from a night's sleep. We have lately conducted an investigation into the causes of the occasional disappearance of nitrite from saliva. Our results indicate that the variations in the proportions or occurrence of salivary nitrite are largely influenced by oral micro-organisms. These findings accord with the opinion which was recently expressed by Lothrop and Gies.

NATURAL PRODUCTION OF NITRATES AND NITRITES.—The natural production of nitrates and nitrites was formerly believed to be due to purely chemical agencies. It was well known that when a mixture of air and ammonia was passed over heated, spongy platinum, ammonium nitrate was formed. It was believed that when such changes took place in nature they were induced by materials with powers in this connection similar to those of spongy platinum. For example, when nitrates and nitrites were formed in the soil from ammonium compounds, the porous earth was supposed to activate the other factors involved.

*Read by the senior author before the New York Institute of Stomatology, May 2, 1911, at the New York Academy of Medicine. This is the fifth paper relating to studies of dental caries which Dr. Gies is directing under the auspices of the New York Institute of Stomatology. The previous papers were published in this journal: (1) Lothrop and Gies, 1910, v, p. 262; (2) Lothrop and Gies, 1911, vi, p. 65; (3) Baker and Gies, 1911, vi, p. 289; (4) Lothrop, 1911, vi, p. 297.

NITRIFICATION IN SOILS.—That biological as well as chemical factors are involved in such processes was shown by Müntz and Schlösing¹. They found that no nitrification took place in soils which had been heated above 55°C. Many workers tried to isolate nitrifying bacteria, but were unsuccessful. Winogradsky² demonstrated that the failure of previous investigators to isolate nitrifying bacteria was due to the fact that ordinary laboratory culture media had been employed. By using media free from organic material Winogradsky succeeded in isolating, from the soil, bacteria which caused nitrification.

At first nitrification in soils was believed to be due to a single organism, but experiments have shown that in some cases *nitrates* are formed, and that in other instances *nitrites* are produced. Two distinct kinds of nitrifying bacteria were isolated by Winogradsky: *One is capable of oxidizing ammonia to nitrite, and the other converts nitrite to nitrate*. The first he called *Nitrosomonas*. This variety grows very well in media containing potassium sulphate, ammonia, and magnesium carbonate. These bacteria cannot be cultivated upon ordinary solid media. Other nitrite-forming bacteria have been described, but all are extremely sensitive to the influence of organic material and grow best in inorganic media.

The genus which oxidizes nitrites in soils has been called *Nitrobacter*. These bacteria, which are among the smallest of living organisms, are much more difficult to cultivate than the *Nitrosomonas*. Their growth is inhibited by organic material and free ammonia.

From what has been said, one might be led to conclude that nitrites could not be produced in the mouth by bacteria, because the nitrifying bacteria of soils do not grow in the presence of organic material. But another important fact is equally well known, namely, that in the purification of sewage nitrification takes place.

NITRIFICATION OF SEWAGE.—The discrepancy between these two observations is explained by Boulanger and Massol.³ Their

¹ Müntz and Schlösing: Compt. Rend. 1887.

² Winogradsky: Ann. Past. Inst., 1890-91, iv. and v.

³ Boulanger and Massol: Calmette et conferes, i, p. 89.

experiments indicate that while the presence of large quantities of ammonia or of organic matter, or both, may impede the initial development of the organism, yet if the growth of the organism is once established, its activity is comparatively unaffected by such substances. Use of this fact is made in sewage filtration. The filters are first impregnated with suitable inorganic materials and the bacteria then are allowed to develop. After development has ensued the liquid sewage is passed through the filter.

DENITRIFICATION.—So far we have considered only those processes by which nitrates and nitrites are produced; that is, processes by which ammonia is converted into nitrite and nitrite into nitrate. But there are also bacterial processes of denitrification. In ordinary decomposition, nitrogenous substances are broken down into nitrites and ammonia or ammonium derivatives. This process is largely due to the activity of various bacteria. Eighty-five out of one hundred and nine types investigated by Maassen⁴ possessed this denitrifying power. The first of these bacterial types to be described were *B. denitrificans* I and II. These bacteria are found in the soil. Bacteria other than those found in the soil also possess nitrate-reducing power. Among these might be mentioned *B. coli*, *B. pyocyaneus*, and *Staph. pyogenes aureus*.

OXIDATION AND REDUCTION.—There are two ways then by which nitrites are often formed under bacterial influences, viz., by *oxidation*, i. e., from ammonia (NH_3 to NO_2), and by *reduction*, i. e., from nitrate (NO_3 to NO_2). Probably each of these processes takes place in the mouth at one time or another.

II. EXPERIMENTAL.

EXPERIMENTS WITH BACTERIAL CULTURES.—The first step in our effort to determine the possible influence of oral micro-organisms on salivary nitrite was the isolation of cultures of mouth bacteria. Three cultures were obtained; two pure, and one mixed. No attempt was made to identify the bacteria.

⁴ Maassen: Arb. a. d. kais. Gesundheitsamt., 1, xxviii, 1901.

The first experiment consisted of two parts. First, three tubes of filtered saliva giving a nitrite reaction were inoculated with the three cultures. One test tube of filtered saliva was allowed to stand uninoculated as a control. Second, four tubes of filtered saliva were boiled. After cooling, three were inoculated with the cultures and the fourth left as a control. Both series were then incubated for twenty-four hours at 37.5° C. At the end of that period it was found that nitrite was absent from the un-boiled saliva, both in the inoculated and in the control specimens. In the case of the boiled saliva the nitrite reaction was strong in both the inoculated tubes and in the control. These and similar results in additional experiments of this kind suggested that the disappearance of nitrite might be due to one or more enzymes, or to bacteria other than those employed in the inoculation.

EXPERIMENTS WITH VEGETABLE OXIDASE.—*On the disappearance of nitrite from nitrite solution.* Lothrop and Gies a year ago suggested that bacterial enzymes such as oxidases might be directly responsible for the absence of nitrite from specimens of saliva collected from subjects immediately after their awakening from a night's sleep. Accordingly we tested the influence of a typical oxidase in this connection. The oxidase solution was prepared in the following manner from material which yields it in abundance: Whole potatoes were thoroughly scrubbed with a brush to remove gross dirt. After washing they were grated unpared to a pulp. The fluid was strained through cheese cloth. The liquid thus obtained was placed in tall narrow cylinders in order that the starch might be completely separated mechanically. After standing an hour and a half the supernatant brown liquid was used for the experiments.

A. In the first experiment each of five test tubes containing the same quantity of a weak nitrite solution (one that would give a positive reaction in about 1 minute) was inoculated with 1, 2, 3, 4 and 5 c.c. of potato juice respectively. These tubes were allowed to stand at room temperature for twenty-four hours. At the end of this period all tubes showed absence of nitrite. The tests were repeated at the end of 48 and 72 hours. The nitrite reaction was negative on all these occasions.

B. Another experiment similar to the first was performed, except that in each case *boiled* potato juice was substituted for fresh juice. After 24 hours all the tubes gave positive nitrite reactions. However, at the end of 48 and 72 hours the nitrite reaction was negative.

This result led to the repetition of experiments A and B, when identical results were obtained.

C. In repeating the second experiment (B) the nitrite was found to disappear within 24 hours. In order to ascertain the cause of this discrepancy, a similar experiment was performed with oxidase from five different potatoes. After twenty-four hours it was found that the nitrite reaction was negative in all cases but one. At the end of 48 hours all showed a negative reaction. The delayed disappearance of nitrite from the one was probably due to the fact that it contained less oxidase or a smaller number of bacteria than the others and therefore required more time for the conversion of the nitrite.

D. A quantitative experiment was next tried. In this experiment the following dilutions of NaNO_2 were used: 1/5,000, 1/10,000, 1/20,000, 1/40,000 and 1/80,000. To each tube 5 c.c. of unboiled juice were added and the total volume in each case made up to 10 c.c. with distilled water. After standing 24 hours the nitrite reaction was positive in the first three solutions, but negative in the other two. At the end of 48 hours all the mixtures in the tubes gave a negative nitrite reaction.

E. The foregoing experiment was then repeated with *boiled* potato juice. After 24 hours the mixtures originally containing 1/40,000 NaNO_2 , or more, gave very strong reactions. The fifth tube originally containing 1/80,000 NaNO_2 gave a negative test. On standing 48 hours all of the mixtures in the tubes showed absence of nitrite.

So far the experiments in this series had been conducted with solutions of NaNO_2 . In the next series of experiments *filtered saliva* was used instead of a solution of NaNO_2 .

F. *On the disappearance of nitrite from saliva: in the absence of toluol.* In the first of this series of experiments equal quantities of saliva in five test tubes were inoculated respectively

with 1, 2, 3, 4 and 5 c.c. of potato juice. An uninoculated tube was allowed to stand as a control. After standing 24 hours the nitrite reaction was negative in all five tubes as well as in the control. At the end of 48 hours the reactions were still negative. This entire experiment was repeated with identical results.

G. In the second experiment which was a repetition of the first (F), *boiled* saliva was used. The juice was *not* boiled. At the end of 24 hours it was found that nitrite had disappeared from all of the tubes. A 48 hour observation also showed the absence of nitrite in all tubes.

H. Additional experiments with nitrated culture media, such as glucose and peptone solutions, and filtered saliva containing glucose or protein, gave essentially the same results, i. e., prompt disappearance of nitrite under the transforming influence of the micro-organisms, directly or indirectly, that grew luxuriantly under the imposed conditions.

It is apparent that the removal of nitrite from samples of saliva may be induced by micro-organisms. This may be due to the bacteria themselves or to free enzymes produced by them. It is probable that in such cases nitrites are oxidized to nitrates. In the case of boiled juice in our oxidase experiments, where the nitrite did not disappear within 24 hours, the enzyme was apparently destroyed by the boiling. The disappearance of nitrite at the end of 48 hours in such mixtures can be explained by assuming that the liquids became infected by bacteria from the air when the 24 hour test was made.

In this particular work *we are not attempting to explain the origin of salivary nitrite*. Small quantities of ammonium compounds occur in the saliva, and also arise in the oral cavity from decomposing protein. By an oxidizing process ammonium radicals may be converted into nitrite radicals. This process of oxidation requires a good supply of air and it is certain that the mouth under normal conditions has a supply sufficient to explain the degree of change of this kind that may occur.

It is known that certain bacteria which are normally present in the mouth have a reducing action. The vegetable nutrients and water together with nitrates excreted by the salivary gland

are probably the source of the nitrates upon which such reducing organisms could act.

That nitrite occurs in the saliva before its entrance into the oral cavity has been shown.

On the disappearance of nitrite from saliva: in the presence of toluol.—Neglecting for the present the question of the formation of nitrites, it is of importance to learn whether the disappearance of nitrite under the conditions we have imposed is due to enzymes alone, or to bacteria directly.

In experiments with these purposes, an effort was made to exclude bacterial activity by using *potato juice treated with toluol*. For this purpose potato juice was prepared in the usual manner and preserved under toluol for ten days. During this period portions were removed each day and tested for the presence of oxidase by the guaiacum reaction. At the end of ten days the juice responded very strongly to the test.

I. Two quantitative experiments were performed, with the toluolized potato juice. The concentrations of NaNO_2 in each experiment were 1/5,000, 1/10,000, 1/20,000, 1/40,000 and 1/80,000. In the first experiment toluolized juice was used and in the second *boiled* toluolized juice. In the first instance the nitrite did not disappear in any of the tubes until the seventh day when it disappeared from those originally containing 1/40,000 and 1/80,000 NaNO_2 . In ten days it had disappeared from all tubes except those originally containing 1/5,000 and 1/10,000 NaNO_2 where the reaction was still strong. In the second of this pair of experiments, nitrite could be detected in all tubes after 10 days' standing.

J. In two other experiments solutions of NaNO_2 were used which responded to the nitrite test in practically the same time as saliva. In each experiment the tubes contained 5 c.c. of the nitrite solution and 1, 2, 3, 4 and 5 c.c. of the juice, respectively. In the first of this pair of experiments where toluolized juice was used, the nitrite wholly disappeared in 24 hours from the tubes originally containing 1/40,000 and 1/80,000 NaNO_2 . Four days passed before the nitrite had wholly disappeared from all tubes. In the second of this pair of experiments where *boiled*

toluolized juice was used the nitrite disappeared in 5 days completely from the mixtures originally containing 1/40,000 and 1/80,000 NaNO_2 . After 10 days' standing, nitrite failed to wholly disappear from the remaining mixtures.

K. In order to determine whether the juice which had been toluolized contained any bacteria, agar slants were inoculated with cultures from the juice. Cultures from juice which had been toluolized for ten days showed luxuriant growth of bacteria and fungi in 24 hours at room temperature. In 48 hours the fungi had completely overgrown the bacteria.

From these experiments we infer that the toluol employed did not destroy all of the bacteria but inhibited their activity; also that boiling the juice completely destroyed bacteria and enzymes.

EXPERIMENTS ON THE NATURE OF THE REACTION INVOLVED IN THE DISAPPEARANCE OF NITRITE FROM SALIVA.—A new series of experiments was next begun in which both fresh and toluolized juice were used in order to determine whether the disappearance of nitrite was due to oxidation or reduction. The toluolized juice was used immediately after the toluol had been added to the fresh juice. In this series of experiments solutions containing known quantities of NaNO_2 , NaNO_3 and NH_3 were used.

Sufficient quantities of these solutions were mixed in sterile flasks with each of the following: Fresh juice, toluolized juice, and saliva. Ten c.c. of each of these mixtures were withdrawn from day to day and tested for ammonia, nitrite and nitrate.

Description of tests. Nitrite. A little of the solution to be tested was placed in a small watch glass. After acidifying with 10% H_2SO_4 solution, a small piece of starch iodide paper was added. If this did not become blue within 10 minutes the test was reported negative. 1/80,000 nitrite solution responded to the test in less than $\frac{1}{2}$ minute.

Ammonia. In potato juice. A. First method. The juice was filtered and Nessler's reagent added directly. In the case of fresh juice a yellow precipitate was obtained. When toluolized juice was used the precipitate produced by the reagent was of an orange shade. It was evident that something in the potato juice interfered with the reaction. In order to prevent their interference proteins were removed by the second method.

B. Second method. Ten c.c. of the potato juice were poured into 50 c.c. of 95% alcohol. The resulting precipitate was filtered off, and the filtrate after acidifying with acetic acid was evaporated to a volume of 10 c.c. This was then neutralized with Na_2CO_3 , and Nessler's reagent added. The fresh juice gave a muddy yellow precipitate. The toluolized juice gave a grey precipitate, then an orange band above which the solution was yellow. Distilled water when treated with alcohol in the same manner showed absence of ammonia.

In applying the test for nitrates it was found that the 95% alcohol interfered with the reaction. This test (to be described later) was repeated using 95% alcohol distilled over glass. The ammonia tests were also repeated using the redistilled alcohol. After precipitation a pale straw-colored filtrate was obtained, which upon evaporation to 10 c.c. became turbid. Upon adding Nessler reagent no change could be noticed, but upon standing a dirty white precipitate formed.

Ammonia in Saliva.—When the reagent was added directly to the suspected saliva a reddish brown precipitate formed. With the alcohol method a white to yellow precipitate was produced. Small known quantities of NH_3 in solution with potato juice and saliva could not be detected by any of the above methods.

Detection of Nitrates.—Attempts were made to detect nitrate by means of the Stoddart reaction. To the solution to be tested by this process a small quantity of pyrogalllic acid is added. Concentrated H_2SO_4 is carefully poured down the side of the tube in order to form two layers, then NaCl is carefully added. The NaCl should be added gradually and should be approximately equal to the pyrogalllic acid used. If nitrates are present a purple ring will form at the junction of the two liquids. This test was found to be sensitive to 1/80,000 NaNO_3 . Small known quantities of NaNO_3 in potato juice and water were tested by this means.

A. First method. The potato juice was filtered and the Stoddart test was applied, directly. *Fresh juice.* Upon the addition of H_2SO_4 a blood red ring was formed, which, when sodium chlorid was added, became greatly intensified. *Toluolized juice.*

The red ring in this case was much more pronounced than in the case of the fresh juice both before and after the addition of NaCl. *Saliva*. The addition of H_2SO_4 produced no change, but the addition of NaCl caused an amber coloration throughout the H_2SO_4 .

B. Second method. In repeating the foregoing tests (A), the juice and saliva were boiled, in order to remove proteins, and the test was applied to the filtrates. *Boiled fresh juice*. The color produced by the H_2SO_4 seemed to be a brown orange, which depended upon the proportion of associated NaCl. *Boiled toluolized juice*. The color reactions here were practically the same as those of the fresh juice. *Boiled saliva*. The addition of H_2SO_4 caused the formation of a pale pink ring, which became orange when sodium chloride was added.

C. Third method. The solutions used in tests A and B were included with others in this series of tests. Ten c.c. of the solution to be tested were poured into 50 c. c. of 95% alcohol. The resulting precipitate was filtered off and the filtrate concentrated to 10 c.c. The Stoddart test was then applied to the filtrate. *Fresh juice*. A straw colored filtrate was obtained by the treatment with alcohol which, upon evaporation, became turbid. With H_2SO_4 a reddish brown ring was obtained, which turned to a deep blood red when NaCl was added. *Toluolized juice*. The filtrate obtained in this case was of a pale straw color. When evaporated the filtrate took on the same color as the filtrate from the fresh juice. Upon adding H_2SO_4 a blood red color was produced which was deepened by the addition of NaCl. *Saliva*. The filtrate obtained was only slightly cloudy, but the turbidity increased during evaporation. When the H_2SO_4 was added a very light pink ring was formed which, upon the addition of NaCl, caused the formation of a thin yellow ring above which there was a broad light pink band. *Nitrate solution*. A solution of known concentration was treated in the same way as the juice and saliva solutions. The filtrate, as first obtained, was clear but on evaporation became turbid. The ring with H_2SO_4 was a very faint purple above an olive band. *Water*. Ten c.c. of distilled water were treated in exactly the same manner as the nitrate solution. Upon the addition of H_2SO_4 a light orange ring was formed which became salmon colored when NaCl was added.

These results indicated clearly that the alcohol interfered with the reaction. Accordingly the tests (C) were repeated, but mixtures consisting of equal parts of alcohol and ether were used instead of alcohol. But again we were unable to detect nitrate when present in known quantities. Finally, alcohol was used which had been redistilled in glass apparatus. Here, as before, interfering substances prevented satisfactory application of the test.

These results show that Stoddart's test cannot be used for the detection of nitrates under the conditions of the experiments here described.

III. CONCLUSIONS.

Our work thus far in this connection justifies the following conclusions:

1. Nitrite may be diminished in quantity in saliva, or wholly removed from it, by oral micro-organisms.

2. The natural diminution in the quantity of nitrite in saliva, or the complete removal of nitrite from that secretion, may be due to enzymes *eliminated* by oral micro-organisms; but such effects are also attributable to *intracellular* influences exerted by these organisms.

3. Neither the occurrence, nor the proportion, of nitrite in a specimen of saliva is an index of the existence or degree of a given case of dental disease, or of the rate of its progress.

We have not determined the nature of the substances into which oral micro-organisms convert nitrite when they diminish the quantity of the latter in saliva or when they wholly remove it from that secretion.

ON THE ORIGIN AND SIGNIFICANCE OF SULFOCYANATE IN SALIVA.*

BY WILLIAM J. GIES.

(From the Laboratory of Biological Chemistry of Columbia University, at the College of Physicians and Surgeons, New York.

In the three papers which immediately precede this one, we have presented the substance of our recent experimental work under the auspices of the Institute. Dr. Lothrop has given you an excellent summary of the general knowledge of oral micro-organisms in their possible relations to dental disease, and has stated the results of the experimental work which we had been hoping would be more immediately fruitful, but which we believe has prepared the way for material advances in the near future. We are planning to resume work actively in this particular connection in the near future. Messrs. Smith and Baker have successfully shown that variations in the occurrence and proportion of nitrite in given specimens of saliva may be influenced by oral micro-organisms, but that such variations cannot indicate anything definite regarding the condition of the teeth of the individuals concerned. The results that Mr. Baker and I have obtained in attempts to improve the method for the detection and quantitative determination of sulfocyanate, have removed certain mechanical possibilities from further consideration but have also emphasized the immediate need of conclusive work in this connection along collateral lines.

Although all the results to which I have just alluded are essentially negative in character, they are clarifying in their present effects, and stimulating in their influence for the future. They

*The substance of this paper was presented extemporaneously before the New York Institute of Stomatology, May 2, 1911, at the New York Academy of Medicine. This is the sixth paper relating to studies of dental caries which the author is directing under the auspices of the New York Institute of Stomatology. The previous papers were published in this Journal: (1) Lothrop and Gies, 1910, v, p. 262; (2) Lothrop and Gies, 1911, vi, p. 65; (3) Baker and Gies, 1911, vi, p. 289; (4) Lothrop, 1911, vi, p. 297; (5) Smith and Baker, 1911, vi, p. 323.

help, by their exclusions, to focus attention and activity upon more salient points.

The title of this communication, as it appears on the program, may suggest that I am about to discuss positive rather than negative facts regarding salivary sulfocyanate, but in this connection, also, it is impossible to do more than call attention to wide gaps that exist in the general knowledge of this particular subject.

Sulfocyanate, in its possible relation to dental disease, has been discussed so frequently, and often so excitedly, that I hesitate to say that next to nothing is known by any one regarding the origin, significance, function, or influence of sulfocyanate in any part of the body, either in health or disease. I am trespassing on your time and patience to-night for the particular purpose of directing attention to a state of affairs which I believe has not been duly appreciated, but which I am sure you would wish to improve.

A careful survey of the many publications on this subject shows clearly that salivary sulfocyanate has received merely superficial attention. The literature is saturated with guesses and theories. Dentists especially have based elaborate beliefs and particular methods of treatment on the shifting sands of assumption. We find that some dentists have been prescribing sulfocyanate internally in comparatively large doses for the institution of immunity or of increased resistance to dental disease, without reporting or seeming to know or even caring anything about the pharmacology of the quantities of sulfocyanate thus administered. Striking inhibitory influences upon plaque formation by oral micro-organisms have been attributed, seemingly without warrant, to homeopathic proportions of sulfocyanate. Dental literature is flooded with words about sulfocyanate, yet the paucity of biological facts regarding this substance is astonishing.

The present status of the published knowledge of salivary sulfocyanate, and some of the most urgent needs in research on this subject, are summarized in a general way below:

The *origin* of salivary sulfocyanate, and the causes of its quantitative *fluctuations*, have not been experimentally established. Current opinions on these matters are guesses for the most part. Elaborate experiments must be performed, on men and animals, before the essential facts can be learned.

The *significance* of sulfocyanate in saliva cannot be fully determined before the origin of sulfocyanate and the causes of its fluctuations are known. What the salivary sulfocyanate signifies is at present hypothetical.

Salivary sulfocyanate may represent *systemic* changes or it may result wholly from *local* activities in the salivary glands. Investigations of the origin and quantitative fluctuations of sulfocyanate in the saliva and other parts of the body, which would include systemic and glandular experiments, might show clearly that sulfocyanate is a general or glandular *excretory* product, or a substance of local (oral) *secretory* importance. The truth in these relations would end recurrent nonsense on this subject, and would afford new light and clear guidance to further discovery in this field.

That salivary sulfocyanate bears a definite relation to the *condition of the teeth*—that it exerts inhibitory or antiseptic and preservative influences, or stimulating effects on oral micro-organisms—is believed by many earnest observers. These beliefs have not been based on or connected with studies of the origin of, or the reasons for the quantitative fluctuations in, salivary sulfocyanate.

Studies of the influence of sulfocyanate on the carious processes and on the associated oral and salivary products thus far have been fruitless.

Little or nothing is known of the pharmacology of sulfocyanate. This whole subject has apparently been ignored by the pharmacologists. One prominent writer (Kunkel: *Handbuch der Toxikologie*) goes so far as to say that the appearance of traces of sulfocyanate in the saliva is neither of physiological nor pharmacological significance, but he himself appears to know nothing about the subject from the experimental standpoint. One wonders why there is so much dogmatic writing of that kind.

If sulfocyanate exerts a beneficial action on the teeth, its administration, in suitable quantities, to persons suffering from dental caries should be followed by improvement of the condition of the teeth or at least by retardation of decay. Observers in the past have not agreed in their findings in such cases. It is desirable to determine in experiments on animals such as dogs,

what influence, if any, is exerted by administered sulfocyanate on the *progress* of decay of the teeth into which cavities of different sizes and in various locations have been deliberately drilled. The progress of decay in natural extracted teeth (in different degrees of soundness) immersed in media containing sulfocyanate should also be determined.

Our knowledge regarding the effects of sulfocyanate on individual oral microorganisms is uncertain and conflicting. This state of affairs seems to be due primarily to the fact that the work in this connection has been even more desultory and fragmentary than that in certain other connections already mentioned.

That sulfocyanate exerts a material influence on plaque formation has been repeatedly affirmed and as frequently denied. Perhaps these contradictions are due to the fact that there is no agreement upon either the cause of plaque formation or on the essential characters of plaques themselves. This particular portion of the field needs thorough investigation from new viewpoints.

It has recently been claimed, apparently with justification, that the methods of determining the presence and the quantity of sulfocyanate in saliva are defective. All past results in these connections are therefore probably open to question. Satisfactory methods must be immediately devised in this connection in order that further study may be conducted with accuracy.

The possible influence of sulfocyanate as an erosive agent, or as an inhibitor of erosion, has not been determined. The possible effects of salivary sulfocyanate on the gums need attention.

Much has been learned regarding salivary sulfocyanate, but little that is definite has any bearing on the important problem of dental caries. New researches, free from bias in every direction, are urgently needed in this field.

ADDENDUM.

Two years ago, shortly after the inauguration of our work under the auspices of the Institute, the writer undertook, with the Institute's approval (for the Research Committee of the Dental Society of the State of New York) a direct investigation of salivary sulfocyanate in its relation to plaque formation. (Seaman

and Gies: *Dental Cosmos*, 1910, lii, p. 1141). A few days prior to the meeting of the Institute at which the foregoing communication was made, and again with courteous approval by the Institute, the writer sent the substance of the above remarks regarding sulfocyanate, with recommendations, to Dr. Dunning, Chairman of the Research Committee of the Dental Society of the State of New York, in response to his request for proposals relating to research that may be specially desirable. (*Dental Cosmos*: 1911, liii, p. 1324). Dr. Max Kahn is now conducting investigations in this laboratory, under the writer's guidance, along the lines thus suggested.

REVIEW OF SOME OF THE CONDITIONS OF PRESENT DAY DENTISTRY.

Read by W. I. Brigham, D.D.S., D.M.D., before the Massachusetts Dental Society, May 11, 1911.

People who are more or less unsuccessful in business are apt to keep along in their accustomed way without stopping to think whether they are doing right or doing the best they can.

This same condition holds good in communities and also in the professions, for professions and communities are but multiples of the people.

In order to change the condition of a community the individual must put his best efforts forward. To change the condition of a profession one must look to the very best efforts of its members.

Not many years ago Dr. Talbot read a paper in this city in which he said that dentistry had not progressed in thirty years.

This to many people would seem like an exaggerated statement, but if we analyze the conditions, it will be seen to be no great exaggeration.

Some few individuals have advanced but the profession as a whole has advanced but very little.

This paper will speak of some of the conditions of present day dentistry. I do not wish you to think that I am a pessimist, but I think some of the conditions are anything but elevating or advancing. The object of this paper is to show how the operative side of dentistry, the most important, is being neglected.

I think I can remember when the first so-called Dental Laboratory was started in Boston, while now I think there are more than twenty-five employing more than two hundred people. Think of the vast amount of work being turned out—but the great question is: Is not much of it ill advised work? I believe more than fifty per cent of it is.

When a young man says he does not fill many teeth, but grinds them down and has crowns made for them, one need

not wonder why so many laboratories and men are needed to supply the demand. Another says he will not wear himself out filling a tooth with gold.

I saw a case where a young man advised a girl of thirteen to have her superior laterals cut off and crowns made for them. This was a case of a beautifully formed mouth with extra fine teeth with only one cavity in any sense large. A short time after I saw this case. I met this dentist and he began to talk to me about gold filling, wishing to get some instruction; for he said he did not have success with gold. In this case this man knew he could not put in a good gold filling, but felt he could do more satisfactory work with a crown—a case of poor judgment from lack of ability, or, rather from lack of instruction. Cases like this are met with very often.

Probably fifty per cent of the gold crowns that people are wearing are on teeth that should be filled. This is not all from lack of ability, but for mercenary reasons. Fortunately there are but few men who will do inferior work if they are able to do good work.

A dealer in dental goods told me a few days ago that he sold to one man an average of fifty ready made gold crowns a month. Now do you think that number went into a legitimate practice? I do not think thirty per cent of them did.

We have another evil to contend with: the so-called dentist who intends to beat every patient that he can.

I recently heard an authentic story of a person paying \$100 for a celluloid plate. The patient expected a rubber plate at a moderate price. The dentist advised gold at a much higher price, but later suggested something more natural in appearance and the patient received a celluloid plate. All these unscrupulous things, gentlemen, are practiced by men in the profession we represent, and many of these practitioners stand well in the community, and are as well thought of as to ability as the man who is doing good conscientious work. I do not think there is a profession where the people are so deceived as in the profession we belong to.

We hear so much about raising the standard of the profession, but what we *should* do, is to raise the standard of

dentistry—the standard of our work. What are the reasons for all these conditions?

One great reason is the desire to get as much as possible for as little work as possible, and another is the lack of education along operative lines. Since we have spent so much time with the medical education of the dentist, the operative side has been neglected. The pendulum has swung to one side and *must* swing back, or our profession, as one man said in my presence not long ago, will become such that we shall be ashamed to belong to it.

Many of you may have read Dr. Talbot's paper in the March Cosmos, but in case some of you have not, I wish to quote one paragraph. After speaking of the necessary medical education he runs off into mechanics, as follows: "In dental mechanical evolution the gold filling of the past has been superseded by the inlay. The tremendous wear and tear upon the nerves of the operator and patient has been done away with, and while finger skill will always be necessary to perform acceptable operations, preventive medicines must take the place of laborious skill. Oral hygiene and prophylaxis are fast coming to the front, but success can never be attained until a medical education is acquired by the practitioner." Now this is another case where the dentist is trying to get work done the least laborious way regardless of the result. Can you explain to me how a medical education is going to make a gold inlay? Evidently Dr. Talbot was never taught to put in gold fillings so that the wear and tear is reasonably small—and never has learned. I never have seen the men who regard the medical education so highly essential to dentistry, demonstrate to us how they save the teeth or put in gold inlays without wear and tear.

Right here I wish to state that I favor the medical education of the dentist, for the higher education can but make the broader man. But I do oppose it when it is acquired at the expense of the dental end. One great trouble with our dental schools is that the medical men have too much voice in them. A glance at the faculty of some of the schools shows more than two-thirds to be men of the medical profession. The medical man looks too lightly at dentistry and regards it as a necessary evil. They look

at dentistry much as the masses do, and think that a gold crown or a bridge is the highest art in dentistry. They look too lightly on the more strictly operative side. A medical man once said to me that he supposed any one could fill a tooth with gold if the cavity was prepared.

If you were going to educate your daughter to be a teacher in Latin, you would send her to college. She would take up her history, mathematics, etc., but would make Latin her major subject.

I want to say a few words in regard to prophylaxis. How fast is this very important field in dentistry growing? A few schools have some very enthusiastic workers, but I cannot find many who are putting this important work where they should. If the dentist could take an impression of a mouth and send it to some laboratory to be cleaned, prophylaxis would take an important start.

Once I was talking with a dentist as to the importance of this work, and the importance of the young man becoming interested in it. He replied that other men could be tooth scavengers if they wished, but he would not be for any one.

At this time when we are trying to get the school children interested in the care of the mouth, it is important that the young man should take a great interest in this, for the young dentist is liable to get many of the children; and here comes the great question—is the recent graduate qualified at the present time to serve these children well? Parents of many of these children are able and anxious to have their children's teeth attended to, and they are just as anxious that the work shall be done in as permanent a manner as possible.

They are not satisfied that the teeth be filled with some of our pernicious cements, and then in a short time be worse than before; but they want something more permanent, gold or porcelain, and with the ability the young man has, can he satisfy the demand?

When one realizes that most of the men who graduate after three years at a dental school come up before the State Board with fear and trembling as to their ability to satisfy the exam-

iners with a gold filling, one says, where is the fault? The young man should be so well prepared after three years that there should be no question as to his ability. I have asked men from different schools if they ever saw a professor or demonstrator fill a tooth with gold; and only one replied that he had, and that by a man who took a few students to his office for instruction. How can you expect students to be very well prepared when such conditions exist?

A great deal of the instruction in cavity preparation and filling is antiquated and traditional—hard and tedious both for the patient and operator.

At the present time many of the colleges are teaching the so-called Black System as the ideal cavity preparation for gold, when no one has ever demonstrated that it had any value. I have seen demonstrators of this system at many conventions, but never yet saw but one man who took a tooth that needed filling, and he exposed the pulp. I think many times instructors have taken up this system of cavity preparation because it has been brought before the profession and having no resources of their own have taken it up for want of something better. A great deal of the instruction is given from large ambiguous plaster models that are next to useless for such technical instructions as the filling of teeth. To get more information of what is being taught I sent letters to six different schools in regard to the teaching of the Black System. The replies say that they use it in a modified form. This is a mistake, for there cannot be any modified form of Black—it is either Black or *not* Black. The inference that I draw from the absence of letters from some is that they use it, but are not willing to state that they make use of a system of which they can demonstrate no good in the using.

I think the teaching of this method comes next to gold crowns in lowering the standard of operative dentistry; for the young man is not able to apply it to his practice and he has to resort to cement or gold crowns.

I want to refer to a paper by Dr. Van Horn in the March Cosmos "On the Service Side of Dentistry." I call it the destructive side of dentistry. His paper is filled with statements of conditions which no skilful man would allow to exist.

"Let us go sufficiently into the technique of restoring lost tooth structure—in the bicuspid and molar region—by the cast gold inlay method, to illustrate, by comparison, its advantages as pointed out in the foregoing contentions. Owing to their positions in the arch, their shape, and their function, the bicuspids and molars have justly been considered the teeth most difficult to properly restore, especially so when the prepared cavity has involved the approximo-occlusal surfaces and extended to a considerable distance beyond the free margin of the gum tissue. To fill such a cavity with gold necessitates the application of the rubber dam with the clamps or ligatures, or both, forced against the gum tissue, and perhaps the pericementum, for one, two, or more hours, during which time the tooth is the recipient of much strain through thrusts and blows dealt in condensing the gold. When the filling is completed, the finishing begins; saws, files, knives, strips, disks, stones, etc., are used in this process, with the result that while the gold is being reduced to harmony, the gum tissue and pericementum are victims of imminent circumstances. Nor is this all. Assuming the operation to have been performed by one above the average in manipulative ability, can this operator honestly assume that the filling is flawless at its margins, that the occlusion will satisfy the most exacting, and that the approximal contact is all that can be desired?" This is the operating that is being taught to-day in most of our schools. I also wish to quote Dr. P. B. McCullough's discussion on the paper.

"I am reminded of a trite saying which the paper seems to have recalled, and am tempted to paraphrase it. The saying is, "It is hard to tell which do us more harm, our friends with the best intentions or our enemies with the worst." The paraphrase is, It is hard to tell which do our teeth more harm, dental caries or dental operations. Indeed, if we pause to review the very considerable time involved in the destruction of a tooth by caries alone, this statement will not appear so extravagant as at first it may seem. The successive changes—from a simple cavity to pulp exposure with coincident pain, until suspension of function and relief from pain, with subsequent putrefaction and sometimes early, and often, an abscess, with eventual and long-delayed pericemental atrophy and exfoliation—require a period of time that

cannot be as certainly measured in its baneful effects as can the pernicious results from radical operative procedures, particularly if these be of the "extension for prevention variety."

What we need in the dental profession is *operators*—men who can save the teeth.

In surgery we hail the skilful operator because he gets results. The man that can demonstrate with his hands that he is *right*. He of course had a medical education but that alone never made him a surgeon. We do not care if he has forgotten it all if he is only skilful with the knife.

Now operative dentistry is surgical therapeutics and the man must have a technical training. Some men need teaching while others learn by themselves.

Now what is the remedy? What we most need is *teachers*—men who not alone can imitate, but men who have resources of their own. The teachers in many schools are the graduates of yesterday and what can they give to students from experience?

Of the large number of clinics given before this convention I think only one man is demonstrating what is being taught in operative dentistry in our two large schools.

I think some liberal advertising should be done by some society to educate the public as to what it is getting. Much is being done to awaken the public to the importance of dental work, but where are the men coming from to do it if we continue to retrograde?

This is a drastic paper written in a drastic way. I have made it short and the story has not half been told. It may raise a discussion on the points that have been taken up, and I'll save the rest till later.

THE MOUTH IN RELATION TO SKIN AND VENERAL DISEASES.

BY WILLIAM S. GOTTHEIL, M. D., New York City.

(Read before the Massachusetts Dental Society, June 12, 1911.)

Mr. Chairman and Members of the Massachusetts State Dental Society,

GENTLEMEN:—In the series of lantern slides that I shall show you to-night I shall endeavor, so far as possible, to restrict myself to affections which have oral manifestations either as a part of their regular symptomatology, or as a complication, together with some of the commoner dermatoses affecting the exposed parts of the body, and therefore liable to be brought to the notice of the dental practitioner. My friend, Dr. M. C. Smith, of Lynn, informs me that it is only rarely that dermal affections are brought to his notice, and he wonders at it. The reason, however, is very plain. Persons with affections of the face, hands or mouth are very liable to postpone their visit to their dentist until they are at least so far improved as not to be objects of question or suspicion. A skin disease is a reproach, in the minds of the laity, very possibly on account of the fact that the popularly considered most "reproachful" disease of all, syphilis, has the majority of its manifestations in the skin. The regulation first statement of a dermatological patient when he enters the office is: "Why Doctor, I never had anything the matter with my skin before;" as if his misfortune was a personal fault. As a matter of fact it is difficult to get dermal patients to consult the dentist at all. This is of especial importance in cases of syphilis, in which it is of prime importance at the very beginning of the treatment, to have the teeth put in as perfect a condition as possible. Not only does the disease itself affect the mouth and teeth, and with the greater readiness, the worse the local conditions are, but the mercurial treatment itself, our therapeutic prop and mainstay, distinctly tends to injure these organs. I quite expect to have a struggle with every patient when beginning treatment for the luetic infection. I insist that they go to their dentist at once, and have all the necessary work done; and I also insist, of course, that they inform their dentist of their infection,

so that he may take the proper precautions for the protection of himself and his other patients. These luetics naturally do not like to inform their dentist, often a personal or family friend, of their condition. But I allow no compromise, other perhaps than going to a strange dentist. The teeth and mouth must be put and kept in good order; and the practitioner who attends to this must be fully informed as to the condition that is present.

I may premise that the pictures that I shall show you are almost without exception those of patients of my own; every step in the process, from the diagnosis of the disease to the finishing of the lantern slide being my own work. I can therefore vouch personally for their accuracy; and in most cases their history is familiar to me.

Eczema and psoriasis of the face are common affections; the four cases that I show are instances of their usual forms. There is little difficulty in recognizing on the one hand the diffuse superficial redness with sticky secretion, and on the other the dry scaly papules or larger plaques. Eczema is by far the commoner affection, psoriasis being almost invariably of the punctate variety on the face. Neither one, of course, is in any way contagious.

Erythema multiforme, of which I show you a Lumiere color slide, appears most often on the backs of the hands and arms and the neck and face as distinctly violaceous elevations, usually non-itching and causing no subjective symptoms. The lips may be affected, though I have never seen it in the interior of the mouth. It is a systemic affection, non-contagious, and may be handled with impunity.

The ordinary vaccine inoculation in some cases occasions a general eruption; this is a true vaccinia or cow-pox, and usually resembles a very mild variolous eruption. Very rarely it is more severe, as in the example that I show you, in which the lesions were bullous, drying up into the extensive and deforming crusts here apparent. Following this is a picture of a child accidentally vaccination on the cheek; there are all the characteristics of a true vaccine lesion, with the addition of marked oedema of the lids and sides of the face. This boy's brother had been vaccinated a few days before in the usual place, and the accidental inoculation (the boy had never been vaccinated) resulted.

Measles is recognizable by the punctate eruption arranged in crescentic form, beginning on the face or upper part of the body, and accompanied by catarrh of the eyes, nose, etc. The picture shows the swelling and redness of the conjunctiva, and emphasizes the importance of always suspecting skin lesions of this kind in a child when accompanied by catarrhal symptoms.

Of the drug eruptions perhaps the two commonest are those due to iodine and bromide, examples of which I show you. That from iodine is usually an acne: and as this is rare in the adult, the affection under these circumstances should always arouse suspicion. Of the bromide eruptions an interesting example is the one here pictured, in which pink, flesh colored tuberculous masses appear on the face and other parts of the body.

Pemphigus is an affection of interest to the stomatologist, since not only is the mouth often involved, but occasionally the first signs of disease appear there, and in rare instances the mucous membranes may be the only seat of the malady. In the case illustrated by this series of photographs the patient had had for several years superficial erosions of the gums, lips, and tongue. These had mostly been regarded as syphilitic, and she had been given mercury in superabundance. Of course vesicles and blebs are never seen on the mucosa, as the delicate covering is immediately macerated and dissolved. My first diagnosis was mercurial stomatitis; but close observation in Lebanon Hospital, where I finally put her, showed that all the lesions began as circumscribed minute erosions spreading into larger raw areas. It was three years after the first appearance of the mouth lesions before she began to show vesico-pustules around the nails; one year later the general integument became involved, and in a few months the patient died the miserable septic death that confronts all these unfortunates. This was an extremely slow case; but many of them are very rapid. I show a picture of one who had had the disease only three weeks when she was admitted to the hospital; I was summoned at once, and got there within an hour or so; but the patient was already dead, and the picture was taken in the dead house.

Other affections showing vesicles or blebs around the mouth are Herpes, Zoster, and Impetigo, of which I show you ex-

amples. None of them are contagious, save when infected with the ordinary pus organisms, and then but to very slight extent.

Mollusum Contagiosum, whose commonest seat perhaps is around the mouth, appears as hard little fleshy tumors with a characteristic central depression. It is called contagious because several children in a family are usually affected; but it is not so in the sense of being dangerous to handle or calling for any especial precautions.

The Acnes, accumulations of secretion in and pus infections of the sebaceous glands, and the tubercle bacillus infection of these structures giving us the adult Acne Atrophica of the temples, nose, and ears I can pass over as sufficiently well-known. Adenoma Sebaceum is a rare affection, appearing as minute or larger permanent rosy red tumors of these glands. Rosacea is a permanent dilatation of the capillaries, arteries or veins of the face due to chronic gastric disturbance, possibly by alcohol or tea, or to external influences, as exposure to wind and weather or to a hot fire.

Erysipelas is of greater importance, on account both of the danger to the patient and to others. The sharply circumscribed hard redness, with the tenderness and the symptoms of general disturbance are characteristic. The affection most likely to be mistaken for it is an Urticaria of the face, where the swelling and redness, and the oedema, may greatly resemble the more serious affection. In the latter case, however, the fugacious nature of the symptoms, the intense itching, and the absence of fever or other general symptoms should prevent mistake.

In rapid succession I now show you examples of several affections occurring on the face. Forunculosis, circumscribed pus infections of the deeper tissues of the skin of the face; Dermatitis Venenata or poison ivy eruption, in which the exposed parts of the body, and especially the face and hands, become the seat of an acute erythematous and vesicular eruption; Dermatitis Herpetiformis, where the patient suffers for many years or perhaps for life from a recurrent eczema-like affection which gets better and worse under treatment, but never entirely disappears; Keloid, insensitive and quiescent tumors of scar tissue that are permanent marks of antecedent ulceration; and

Leucoderma, where there is no change in the skin but a disappearance of the pigment in spots, and from which we get the "Leopard Men" of our dime museums.

Hereon follow some affections of more immediate stomatological interest. Rhinoscleroma is a hard, benign, slow growing tumor formation involving the nose, lips, hard and soft palate, gums, etc.; the diagnosis is made on the ivory hard, insensitive, and slowly growing mass, which causes trouble only by mechanical obstruction of the nares, hindrance to motion of the tongue and lips, and deformity. The ultimate fate of these patients, however, is usually death from extension to the larynx and consequent laryngeal stenosis. Of Lichen Planus I show you a number of slides, including one of the disease on the tongue. The mouth, and especially the palatal mucosa, is affected in many of these cases, sometimes before the general integument. Here the lesions appear as pin-head sized or larger, rectangular, dull white spots, gradually increasing in size into larger areas. There is no infiltration, no ulceration, and strange to say, none of the itching that is so prominent a symptom of lichen planus of the skin; and the patient is usually entirely unaware of the presence of the mucosal lesions.

Next I show examples of what is popularly known as barbers itch; under which designation at least three common affections of differing importance are grouped. The first is Eczema of the Beard, a readily curable and inoffensive malady, with the same redness, slight swelling, and sticky secretion that is characteristic of eczema elsewhere. The second, Folliculitis of the Beard, is more important; for pus infection of the hair follicles is obstinate, deforming, and contagious. Inflammatory papules and pustles pierced by hairs are characteristic of the affection; extensive skin destruction and scar formation occurs; and as the disease may last for many years the ultimate result may be complete destruction of the skin of the bearded face. Still more contagious is Ringworm of the Beard, also called barbers itch by the barbers; here there are deep seated and extensive infiltrations, with pus infection in addition to the ringworm fungus; it is of course very contagious, and is to be handled with caution. The special strain of trichophyton that causes it usually comes from the horse, and is very resistant and virulent.

Ichthyosis, of which I show some slides, affects the skin of the face and the lips, as well as the rest of the body; the skin is natural in color, but slightly scaly; this is a deformity, and not a disease, persists through life, and is quite irremediable; it is also perfectly harmless. In the same category comes Alopecia Areata, where the hair falls out in circular patches of varying size, which may spread so as to occasion complete and permanent baldness. The skin of the affected areas is entirely normal in appearance; and though we are yet ignorant of the nature and cause of the disease, we do know that it is innocuous and non-contagious.

Ringworm of the Face and the Scalp, of which I show you several examples, is contagious, of course, though not so much so as ringworm of the beard. Nevertheless the fingers of any one treating such cases may be the means of transfer, and they had better be classed among those not to be dentally treated until they are cured. Favus is of course still more dangerous; but the peculiar sulphur-yellow cup shaped crusts around the hairs are perfectly characteristic of this parasitic disease.

Tuberculosis of the mucous membranes and skin of the face and mouth appears in various forms, of which I show you examples with the briefest of comments. In what is known as Scrofuloderma there is tubercular infection of the superficial and deep lymphatic glands and of the skin after the tumors have broken. These chronically inflamed and swollen glands, or open ulcerations or sinuses, with possibly exuberant granulation of the skin, are quite common and characteristic. Rarer is the appearance of tuberculosis in the form of a granulomatous tumor, of which I picture an example on the lower lip. Lupus Erythematosus or butterfly lupus is an affection of supposedly tubercular nature, though dermatological opinion is not settled on that point. Beginning usually as a chronic inflammation of the skin of the nose, it spreads slowly for years, leaving scar tissue behind, and finally causing the extensive destruction and deformity shown in the case here presented. Finally, Lupus Vulgaris, or true lupus, begins as one or more insignificant little spots, looking for all the world like a droplet of apple jelly imbedded in the skin. But it is a true tuberculoma, and contains the bacillus; and in the course of time it causes the extensive deformity such as I show you examples of here. None of these tubercular affections are

dangerous in the sense of contagiousness; the disease is not transferred from one to another; and even the patients themselves may and usually do have tuberculosis of the skin for years and even for life without infecting their own lungs or other internal organs.

Of Leprosy, as a matter of general interest, I show several slides illustrating the commoner tubercular and anaesthetic forms of the disease. Several of them are patients that have been under my care in the City Hospital and in private practice. I call especial attention to the last one, a woman who had the most marked, general, and deforming tubercular leprosy that I have ever encountered. Her whole skin, including that of the face and hands, was one mass of purplish-red tubercles and tubercular masses. She was an Italian, ten years in this country, had had the disease for twenty years, and had not only slipped through the hands of the emigration authorities, but had lived for years in one of the most crowded sections of the city without her disease being detected. She dwelt in a tenement of three rooms with her husband, eight children, and several lodgers; and she kept a grocery store in the cellar of the building where she daily sold to customers. Yet her general health was good, and all her family, including some children born long after she knew that she was infected, showed no signs of the disease. Such a case as this emphasizes the correctness of the attitude of the New York Board of Health, which no longer regards leprosy as a contagious and therefore reportable disease; and does not intern lepers; and it demonstrates the folly of the public and the ignorance of some medical authorities, who shun lepers, put them in box cars on isolated railway sidings or in huts in the woods, and hand them food at the end of a stick. Incidentally I may mention the fact that there has not been a time during the last twenty-five years when there has not been from one to six lepers in the general dermatological wards of the City Hospital here. Outside of some general precautions with their dishes, etc., done more from regard to their susceptibilities of the other patients than for other reasons, these patients have lived in the wards and worked in the hospital when able, with the others; and there has never been the slightest reason to suspect any transfer of the disease.

Next I show you a series of "before and after" cases of Epithelioma of the Skin and Mucosae, treated in the method that I advocate, the caustic one. A very large proportion of the cancers of the skin can be cured more quickly, more pleasantly, and more permanently by this than by any other method; as regards the last factor, permanence, I show you photographs of the site of the lesion taken years after the work was done, and with perfect results. One point, however, must be emphasized. The caustic method is suitable for cancers of the skin and mucosae alone; it is not suitable for cancer of the deep glandular structures, as the breast. I have written quite a good deal on this subject in years gone by, and I am frequently in receipt of letters from all parts of the country regarding the use of the treatment in cancers of the breast, uterus, rectum, etc. Cancer of the skin, in the great majority of cases, not only does not require the use of the knife, but can be radically cured by the proper use of arsenious acid, the acid nitrate of mercury, caustic potash, etc. I can safely say that I have permanently cured hundreds of them.

Finally we come to the interesting subject of Syphilis, which I shall touch upon only, however, in so far as it interests the stomatologist in affecting the face and mouth. I show you a number of cases of Chancre of the Lips, next to the genital the commonest infected site. Some of these show a most insignificant and apparently innocent little tumor, and teach us the lesson to suspect any lump of any kind on the lips or tongue, especially when it is painless and the patient regards it as trivial. The only safe course for the dental practitioner to pursue is to refuse to treat any case of the kind until assured from authoritative sources as to its nature. It is unfortunate that the syphilitic initial lesion is so often an apparently trifling and negligible affair; and this explains the frequency with which the affection is unwittingly transmitted in sexual and non-sexual ways. Of course, when there are several ulcerated lesions of the lips, only a very careless person would not suspect them; I show you several pictures of the kind. Chancre of Tongue, of course, could readily be concealed; I show amongst others one of a lesion of this kind in a cigar-maker. This girl had a friend with an initial lesion of the lip; they worked together in the same factory, and followed the usual custom of finishing the ends of the cigars with saliva in-

stead of the more troublesome paste. I regret to say that my utmost efforts did not suffice to make these girls stop work; and my efforts, had they been successful, would have helped only a little. In the prolonged secondary period of the disease these girls would undoubtedly have had mucous patches, even more contagious than the chancre; and I could not expect to get them to stop work for indefinite periods and remain under surveillance. The only consolation was that tobacco is a fair antiseptic, and that anyhow the spirochaete in the dried condition lives only a short time. I have never encountered any mouth infection that was even probably due to cigars.

And now a case or two of the more unusual sites for the chancre; it being merely an accident that most initial lesions are seated on the genitals, these being the regions where intimate and prolonged contact between the integuments of two human beings most commonly occurs. Hence Syphilis is not in any true sense a venereal disease; it is a chronic infection, like tuberculosis, most often communicated in sexual intercourse. Two of these cases deserve especial mention. This jovial old gentleman consulted me at the Lebanon Clinic for a sore nose, due, he said, to a "tump on de conk" several weeks before. He had a large necrotic sclerosis that occupied the entire bridge and tip of the nose. The other case shows a large hypertrophic chancre over the first phalangeal joint of the right middle finger. He was taking his sister home after theatre some six weeks before, and got into an altercation with some men who insulted her; he cut his hand against the teeth of one of them whom he knocked down. The cut did not heal, and finally developed into the lesion. Both these cases subsequently showed the other evidences of systemic disease.

Of the secondary syphilitic eruptions I show you a number of examples, confining my specimens as far as possible to the face and hands. I have learned to regard the color of these macules, papules, and tubercles as good indications of the severity of the infection; the darker they are the more malignant the systemic poisoning. A pigmented syphiloderm, whether general and secondary, or localized and tertiary, means a malignant syphilis. How severe and short the course of such an infection may be in certain cases is shown in some of the pictures of cases

which, in spite of the most energetic and approved treatment, death resulted from the disease in a few weeks. Luckily these cases are rarely met with.

The Syphilitic Alopecia is of interest, since the moth-eaten appearance of the scalp may enable us to detect the presence of early constitutional syphilis when no other signs are present. Suspect any case in which there is a general falling of the hair over the entire scalp; the individual has either had an acute febrile disease recently, or a syphilitic infection. Condylomata Lata or true flat venereal warts require no special elucidation. On the other hand, the syphilitic affections of the tongue are frequent and important. I show you examples of Mucous Patches, and Superficial Syphilitic Glossitis, both extremely contagious and to be avoided; and of Deep Syphilitic Glossitis and Gumma of the Tongue in various stages, in which there is no danger save to the patient himself. A few examples of the Malignant Type of the disease, happily rare, will serve to show the devastation that it may cause.

Finally Hereditary Syphilis, though not contagious, is of interest on account of the frequency with which the teeth are involved. The Hutchinsonian Triad, the three symptoms on which the diagnosis of heredo-syphilis is often made, is the Defective Hearing, Interstitial Keratitis and corneal scars, and a peculiar deformity of the teeth. As there is much misconception as to the exact nature of form of these Hutchinsonian teeth it will be well to emphasize it here. It is a deformity of the two upper central permanent incisors, which are peg-top shaped and incurvated on their free borders. They are not to be confounded with the ridges due to febrile diseases, or the longitudinal defects caused by rickets, etc.

154 West 77th St., New York City.

OXYPHOSPHATE CEMENTS.

W. V-B. AMES, D.D.S.

My subject as given might suggest that I intended treating all phases of the Oxyphosphate question. It might more properly have been given as The Present Oxyphosphate Cement Situation.

When a few months since I was requested by your committee and ordered by your President to prepare a paper on cements, my acceptance was based upon the thought that tabulated tests of the various qualities in the cements familiar to you, would prove of most interest.

I found, however, that an at all exhaustive presentation of such tables, would be so lengthy as to mar the interest and exclude considerable matter needed in clearing the atmosphere. The outcome has been the presentation of the results of such tests in as few words as possible, thus allowing the summing up of the present oxyphosphate cement situation.

I was asked, in effect, to present a paper as practical as I could make it on the uses of oxyphosphate cements, tintured with only as much of the chemistry and manufacture as would tend to elucidate the subject. The most practical treatment of any subject embodying the use of manufactured materials must deal with those materials identified by their real names. Although in my position comparisons are distasteful, I cannot do other than use real names in mentioning materials in this effort to clear the atmosphere. Some investigations of these cements have, to the minds of most listeners and readers, lacked real value, because the identity of the materials has not been disclosed.

Happening to be the one individual *easily available*, in possession of a considerable knowledge of the manufacture of oxyphosphate ingredients, and possessed at the same time of the advantage of a fairly ripe experience in clinical dentistry, I trust that I will not appear too egotistical if I criticise more or less freely, and expose as fallacious much alleged information offered on this subject. Were Dr. J. Foster Flagg—whose place I have attempted to occupy as originator and manufacturer of certain articles useful—yet with us, and had he re-edited his "Plastics" to date, I feel that he and I would be today almost completely in accord on theory and practise.

Information obtainable from dental chemistries, dental formularies, and magazine articles, generally seems to be based either on tradition or insufficient investigation. I prefer to comment but little on the information advanced by the manufacturing fraternity, although I will need to make indirect reference to several fallacies thus advanced, which will probably be recognized.

The oxids of zinc, calcium, iron, cobalt, manganese, and of some other metals not important to the subject, exhibit the property of combining with acids and acid-salts to form basic salts, when the oxide is presented to the acid in excess.

These basic salts have the property of acting as agglomerating media to hold together crystals or granules of the same oxid or other materials, the result being a more or less dense mass which may answer as a dental cement.

The crystalline forms of zinc oxide when reduced to an impalpable state furnish the best examples for cement making purposes.

Calcium oxide in any form acts violently with phosphoric and some other acids to form basic salts. It constitutes the chief active principle of the powders of the silicious oxyphosphates.

Copper oxids, black cupric and red cuprous, are valuable as cement makers when presented to an acid phosphate. The black cupric oxid proves more valuable than the cuprous.

Various forms of iron oxid manifest the cement making property, but are mainly useful in small percentages as modifiers. Brown oxid of manganese is quite similar to iron in its behavior and is only useful in the same small proportions.

Cobalt oxid in a pure state and of a proper oxidation is a cement ingredient of great value. Cobalt properly oxidized will react so violently with an acid phosphate solution that heat too intense to be tolerated will be developed, and by that definite setting a material is produced which is incomparably superior in density and strength to any cement mass I have yet observed.

While a cement produced by combining an acid phosphate solution and black oxid of copper is much superior in density and strength to the best possible oxyphosphate of zinc, so that therefore an oxyphosphate of zinc may be improved as to texture

according to the ratio in which copper oxide is properly added, any of these combinations may be vastly improved by the proper addition of a percentage of cobalt oxid. There has been much twaddle about danger resulting from arsenic carried by crude copper and cobalt, but it is merely twaddle. Cobalt oxid and cobalt salts of commerce are prepared mainly for use in the production of blue glazes and for a good blue glaze the cobalt must be freed of arsenic and other impurities. In the processes of refining, the removal of iron, lead, bismuth and nickel presupposes the removal of the last trace of arsenic, so that if no other precautions were taken, this is sufficient assurance that arsenic free cobalt is obtainable. Copper being prepared electrolytically, purity here is easily secured.

The fact that the usual form of cobalt oxid has no cement making property and that the production of a cement-forming grade of oxid is apt to be the result of inspiration in addition to deliberation, easily accounts for this oxid being so little employed as an ingredient. The maker of Caulk's and Ash & Sons copper cements used for several years about three per cent. of cobalt oxid along with some thirty per cent. of copper oxid, in rendering oxid of zinc powder dark gray, and at the same time made much ado about the dangers of arsenical contamination of copper and cobalt. It happens that this maker of cement is now a shade more consistent by having abandoned this three per cent. of cobalt as he easily could, since it was not contained in a form calculated to insure extra integrity, but was apparently used to assist a moderate proportion of copper in insuring a reasonably dark-colored product.

It may be said in this connection, in view of the infinitesimal amount of arsenic needed for pulp devitalization, that, were an ingredient dangerous from a standpoint of carrying arsenic, 30% or even 3% it would be sufficient to preclude its use.

Of the principle oxids used in oxyphosphate cements, zinc oxid might be most easily expected to carry a trace of arsenic, as in the distillation of zinc and the sublimation of oxid, some arsenic might condense in either process. The producers of commercial zinc and zinc oxid need to, and do, look carefully to the elimination of arsenic which being much more volatile than

zinc, is easily disposed of. It is then up to the cement maker to know of what he is using.

Pigmenting of zinc oxid may be harmful or beneficial, depending on the means employed. The necessary metallic oxids may be combined at a calcining heat with a resulting benefit. Any statement to the effect that without pigmenting oxids heat alone will give all desired shades from the natural creamy white to dark grays and browns, is simply ridiculous and the giving out of such statements by people who know better is beyond understanding.

In speaking of phosphoric acid as a cement ingredient it is always an acid phosphate solution which is really meant, as straight phosphoric acid is seldom used for oxyphosphate cement purposes. By the modification of phosphoric acid by phosphates, practically any working quality desired may be obtained. The early cement liquids were usually solutions of glacial phosphoric acid. As recently as in the August, 1911, Dental Brief, Dr. Dameron makes the statement that the liquids used for oxyphosphate of copper cements are the usual glacial phosphoric acid solutions. This appears to be information based on tradition.

This glacial acid is the result of dissolving an indefinite amount of sodium in some form—depending on the manufacturer's ideas or whims—in normal phosphoric acid. Cooking this solution down through the stage of being pyrophosphate solution to the condition in which it is a metaphosphate, this glacial phosphoric acid is an indefinite mixture of metaphosphoric acid and sodium metaphosphate. The amount contained depends on the opinion of the manufacture as to the proportion needed. The sodium is introduced to give a glassy stick, less deliquescent than would be a stick or lump of plain metaphosphoric acid.

This material then, as found in commerce, is a variable compound. It is a coagulator of albumin, and therefore for that reason the solution as metaphosphate is not adapted to be used as a cement liquid. A solution of this can, however, be converted back into normal phosphoric acid and normal sodium phosphate by boiling with an excess of water, which solution is not a coagulator of albumin, and which may be used as a cement liquid when reduced to a proper specific gravity.

This explanation of the nature of glacial phosphoric acid and liquids resulting from boiling its solution in water seems advisable, as many early attempts at cement making were based on its use, and as many formulas have been published in which this indefinite commercial glacial acid is specified. If a plain sodium phosphate solution is of sufficient

value for the purpose to call for its preparation, the proper method is to add a proportion of sodium carbonate or phosphate ascertained to be the proper amount, to a definite weight of orthophosphoric acid of a definite specific gravity, instead of buying an indefinite glacial phosphoric acid which will vary as purchased from different manufacturers, and probably at different times from the same manufacturer.

I dilate to this extent, not because it is highly useful as a cement ingredient for oral purposes, but because it is a useful solution for a cement for technical purposes as making of models, and other masses not to be subjected to moisture. A cement produced by mixing this solution with a good grade of heavy zinc oxide will have fair strength in the dry state, but will, at best, be a porous mass and as the agglomerating basic sodium phosphate is slowly soluble in water, such a mass would be of little use under oral conditions.

The rather prevalent belief that an oxyphosphate cement filling is not dependable at the cervical margin is largely the result of observation of approximal fillings made from cements compounded with an acid solution of sodium phosphate. These failures were not from solution or breaking down of the cement at this point, but from a leak created before the operation was dismissed as finished. Because of the lack of crispness during the setting there is the danger of drawing the cement away from the cervical margin in finishing or by the removal of the dam without cutting the septum occupying the space. It has often been ventured that such failures too often are the result of slovenly cavity preparation and moisture at the cervical region.

While sodium phosphate entire is not a desirable modifier of phosphoric acid for oxyphosphate cement for oral purposes, this phosphate does impart desirable working qualities and has also a salutary control of shrinkage and expansion when added in small percentage along with non-alkaline phosphates, such as aluminum, zinc, magnesium, and some others. These non-alkaline phosphates are depended on by the makers of the cements which have been found reliable. This reliability comes from density and imperviousness and these properties are attributable to the comparative integrity and insolubility of the basic phosphate formed in cement masses.

Sodium and other alkaline phosphates in cement give the possibility of a hastened setting by application of heat, which fact contraindicates the use of some descriptions of liquid in mid-

summer and renders them advisable for winter use. There have recently appeared some tirades against sodium phosphate as a cement ingredient in one of which the hygroscopic property of sodium chlorid is cited as an argument against the use of sodium phosphate. More sense in placing a ban on calomel because corrosive sublimate is a powerful poison. Some alleged analyses have appeared in the same connection which scarcely deserve notice, but which may disturb the understanding of some, in which it is claimed that Justi's liquid contains 68%, Harvard 65, Caulk's 59, Ames 55, and Fellowship 50 of sodium phosphate. As analyses these figures are ridiculously faulty, or as guesses they are ridiculously wide of the mark. In none of these liquids is there any such proportion. With some no more sodium phosphate would be found than a careless analyst would obtain from unclean glassware.

On variously combining phosphates with phosphoric acid and water depends the differences of setting qualities, shrinkage and expansion, and as has been stated, the comparative integrity of mass. Imperviousness (non-porosity) is practically another manner of speech for integrity of mass. Porosity may be present—it might be said—in any moderate degree and not absolutely banish a cement from the usable category, while beyond a very circumscribed limit, shrinkage or expansion does place a cement outside of the usable category.

In other words, slight porosity in a cement as indicated by a vague pink tint after submission to eosin stain, is not a fatal fault, while an easily perceived shrinkage as indicated by eosin solution passing between a cement mass and the wall of a glass tube, or as shown in a Wedelstedt tube by measurements made by a Black micrometer, ought, I believe, to be considered as inviting failure. Cements which expand seriously may (and are apt to) show porosity because of a faulty crystallization. Expansion easily discernable in a cement may not, for some purposes, be fatal, yet an easily discernable expansion cannot be said to be a *positive advantage* in any use whatever. In a paper some years since, I endeavored to make it plain that expansion is due to the taking up of water because of a deficiency of water in the modified acid for proper crystallization. It was stated that an excess of water above the amount needed for crystallization would result in the giving off of water and a resulting shrinkage, and that the taking up of water for proper crystallization would result in expansion. Thus shrinkage and expansion may be regulated in compounding a cement liquid by adjusting the proportion of water, having in

mind that for most purposes about a certain manipulation and consistency of mix will be recognized as proper. A too thin mix from a given formula will show expansion, whereas a very stiff mix will show slight shrinkage, the very thin mix and very stiff mix both being illadvised. The evident reason for these two observed results is that in each case the formation of the different grades of basic phosphate require different proportions of water for crystallization.

By easily made tests, with cements which I will mention in the order of their introduction, results such as I describe are obtained. In all tests the conditions under which the cement must exist in use in the mouth ought to be adopted in carrying on tests out of the mouth.

A cement which has not held a conspicuous place for ten or more years, from merit or per force of publicity, or which has not shown some remarkable qualities during a shorter period of use, I do not feel called on to mention.

I do not feel that actual formulas need concern us in this connection, my understanding being that you are desirous of being told the result of my observations of the cements in most general use.

Justi's cement has held a place in dental procedures for more than 30 years, and must, therefore, be possessed of unusual merit. The claim, however, that the formula of this cement has not been changed in 37 years, I do not consider as entirely commendable. In fact the absence of crystals in the liquid as furnished now for some years, indicates a change, as the early product usually contained precipitates. Its producer was one of the earliest to depart from the sodium phosphate formula. This was the first oxyphosphate of zinc cement, unless it was the Rostaing, setting with the proper crispness to insure cervical margin safety. Eisfelder's, another German product, is very similar to the Justi and has been on the market for about the same period.

These cements, kept dry for a sufficient time for setting before being subjected to moisture, give a mass which is very slightly porous, shows exceedingly well in adhesion tests, and shows a barely perceptible expansion. These desirable qualities, expansion practically nil and exceedingly good adhesiveness, are dependent on the liquid element, the powder being rather coarse heavy zinc oxid.

Harvard cement, now in use nearly 20 years, is even slower of setting than the Justi, and requires a longer protection from moisture. This slower setting is partly from modification of acid and partly from modifications of the zinc oxid. Phosphates and other oxids are incorporated in the powder for good reason, we will grant, one result being a retarded setting. Harvard Quick Setting Inlay Cement is very little quicker than Harvard regular. The liquid is labeled pyrometaphosphatische dentinogen. Since a pyrometaphosphoric compound would be somewhat caustic and a serious irritant, I do not believe that the material is as bad as its label would indicate. This cement, protected from moisture for a half hour or more gives a mass which will show only slight porosity after subjection to eosin. A considerable expansion is inevitable with this cement after a stiff mix properly subjected to moisture and a greater expansion after a crown setting mix. Dr. Kulka, in "Items of Interest," May of this year, says "all cements show on their exposed surface a tendency to protrude in a rounded shape as soon as they are placed in the cavity." This statement and others in his article would indicate that he is familiar with no other cement than the Harvard, unless he uses Lynton, the sale of which was attempted on this side some years since. This cement expands more than Harvard. Adhesion of Harvard cement is quite satisfactory, as evidenced by tests and the testimony of users. The marked expansion is attributable mostly to powder modification. Careful dilution of the liquid with distilled water has resulted in a more satisfactory combination in the hands of a few operators. A more practical modification for the cure of the marked expansion would be the elimination of phosphates from the powder by the manufacturer.

Silex Email, a French product, introduced during the latter years of the last century, would seem to be intended by the makers principally for the filling of cavities, as the powder is very coarse. For filling purposes it has proved dependable.

The next calling for chronological mention are the Ames cements of the oxyphosphate of zinc class. When somewhat more than twenty years since the writer became impressed with the practicability of the cemented metallic inlay, there arose the desirability of a different cement than was then obtainable. The Justi oxyphosphate of zinc happened to be the one relied on for

crown setting and for all other purposes requiring attachments for long periods of time. Crowns set with that material thirty years ago are in acceptable condition today, as far as the cement attachment is concerned, and gold inlays of the burnished matrix type twenty years in service bear evidence of the reliability of this cement. However, when we became impressed with the practicability of the cemented metallic inlay and the porcelain inlay as made twenty years since under selected conditions, there arose a seeming need of a cement combining a finer and smoother powder, a somewhat quicker setting, and, if practicable, a cement with what we are in the habit of calling "hydraulic" properties. Experimentation on our part developed the Ames Special Crown and Bridge and Ames Special Inlay Cements. Since quick setting, and the property of setting better when subjected to moisture during the setting process appealed to me and many others, and seemed clinically practicable, these cements have been mostly used in the combination of "C" liquid with variously compounded and tinted powders.

These cements as compounded with the "C" liquid do give prompt setting and the surplus, which should be left at any joint until setting has progressed to a leathery stage, may to advantage then be subjected to moisture, i. e., the saliva may be allowed to come in contact with this surplus, which in a few minutes will be sufficiently crisp to be removed in a few sections in a cleanly manner. The cement within the joint will then be far past being damaged by moisture, and should have moisture for complete and proper setting.

The makers of the so-termed hydraulic cements have been often misrepresented as to their claims and advices in regard to this property in cements. Dr. Prinz, in his Dental Formulary, gives an erroneous impression in a foot note in which he says: "Hydraulic cements give better results, according to Ames, if the cavity is slightly moistened with water after it has been dehydrated with alcohol."

It cannot be found that I have ever advised placing cement upon a surface actually wet, as that would represent much more moisture than would be taken up by an ordinary mass of cement during crystallization. I have advised against desiccation of tooth structure by hot air, alcohol, or any such means preparatory to applying cement, and I have advised the *merest moisten-*

ing of a surface with *cement liquid* to facilitate the flow of the cement to intimate contact with all inequalities. I have also advocated treating with water and then drying reasonably any cavity surface suspected of being abnormally dry from protection by the rubber dam for an adjoining operation, and the treatment by sodium carbonate solution followed by distilled water and absorbent cotton of any surface possibly contaminated by mucus or medicines. It seems no more reasonable to expect to flow cement advantageously to a desiccated tooth surface than to flow plaster-of-Paris to the surface of a plaster impression which has not been properly moistened.

To return to the subject of the stage of setting at which a cement mass may be subjected to saliva, it can be said that a cement, such as Ames' C & B or Inlay, when mixed to a *putty-like consistency for filling purposes*, may best be treated to moisture immediately after packing and approximately shaping the plastic mass and having the patient bite upon tin foil to save trimming for occlusion, the final shaping and finishing being completed after the cement has become decidedly crisp under moisture.

The Ames powders compounded with "C" liquid give prompt setting, no perceptible porosity in eosin solution, no perceptible shrinkage or expansion in glass tube tests, and a very slight expansion as measured in a Black micrometer. The adhesion to tooth structure and metal and porcelain is such that much use has been made of the combination in the attachment of inlays, crowns, bridges and orthodontia appliances.

During my early clinical use of these quick-setting hydraulic cements a need was recognized, mostly in mid-summer, of a slower setting combination. It was my custom to use and recommend the Harvard or Justi liquid with the Ames powders under such conditions. Later Ames D. & E. liquids were prepared to meet such needs.

The Ames powders, as used with the Ames "D" liquid, give masses showing a very slight porosity, the merest perceptible expansion as measured by the micrometer and provide a grade of adhesiveness sufficiently above the quicker setting combinations to warrant the expenditure of the extra time its use requires in the attachment of some precarious appliances.

The special advantage accruing from the use of such a liquid is from expansion being practically nil, which suggests its use in attaching porcelain inlays, with which less mechanical retention is offered than in cases of metallic inlays, crowns, and orthodontia appliances. With any of the latter a slight expansion decidedly enhances the result, while practically all porcelain restorations built to the most approved cavity preparations, need a cement which will set without shrinkage *as a matter of course* and one with which the expansion is practically nil.

Ames' "C" and "D" liquids may be blended in any proportions called for by setting desired, deriving in such use extra adhesion in proportion to the percentages to the blend. A practical means of rendering Ames' oxyphosphate of copper slower of setting is by blending Ames' "C" liquid with that of this cement to the extent needed for proper retarding in midsummer.

The Ames "E" liquid with the same powders will give a mass with very slight evidence of porosity, no shrinkage or expansion in either the wet or dry state, as there is internal compensation, because of which there is no peripheral change. A cement resulting from the mixing of this liquid with a proper heavy zinc oxide will set slowly at ordinary or sub-normal temperature. Under tropical, or other similar conditions, this combination will set rapidly after crystallization begins. At any season or under any reasonable conditions, the setting of such a cement will be accelerated by the normal heat of the human tissues, and the setting can be further accelerated by an elevation of temperature from any consistent source.

Ames "A" liquid will give so rapid a grade of setting that its use is not advised, in this connection, except for fillings needing rapid manipulation. It will provide an ultra-hydraulic quality, thereby rendering possible some operations which would be impracticable with a slower setting cement or a cement seriously damaged by saliva during its setting.

These "E" and "A" liquids may be blended in equal parts, or one "E" and two "A" to give a medium setting liquid superior to any other known to me, unless the operator would go so far as to incorporate with this a proportion of Harvard, Justi, or Ames "D" liquid, as, for instance, two parts "E" and one part "A" and one, two or three parts "D," depending on the degree of retarded setting desired. An acid solution containing the modifying ingredients of "E" and "A" liquid, however, would be of no value if put out as a single liquid, because of precipitation taking place in a few days which precludes the use of this mixture except as blended by the operator.

The Fellowship and Caulk cements, each of less than my prescribed age, were included by Dr. C. M. McCauley in a recent paper in the list of four "most called for at the depots," the other two being the Harvard and Ames, the Justi not happening to be

included in this classification. Of these cements I had little clinical knowledge previous to my retirement from regular practice, because of experimental tests which did not warrant their clinical use. Shrinkage and brittleness, put these cements with me beyond extensive clinical consideration and restrict my comments.

I do not consider that the question of the reliability of oxyphosphate of zinc cements for the purposes for which they are used, can be summed up or dismissed by basing conclusions on what we may think of any one manufacture, as in that case we might say that such cement has been reliable from soon after the early beginning of experimentation with and use of it, on the ground that there has been the Justi and some closely allied products showing a sufficiently good clinical record from almost the beginning of oxyphosphate of zinc cement history. We might say from other observations that crown and inlay operations are wholly unwarranted.

The average result of cement operations as they are *observed* is the basis of opinion, rather than the *possible* result, which the observer often knows not of. It is, therefore, not surprising to often note references to the unreliability of oxyphosphate of zinc at the cervical margin when used as a filling material, and to its being the weak "link in the chain" when used in attachment of crowns and more especially of inlays.

It is the misfortune of the dentist and his patients that for various reasons the few safe cements have not been used as exclusively as their merits would warrant, as is indicated by the Justi preparation having been omitted by Dr. McCauley from his list of cements submitted to tests.

The *Items of Interest*, November, 1910, printed from Dr. Fred S. Bell a paper, "Practical Hints on C & B Work," and *The Cosmos*, May, 1911, felt justified in quoting a paragraph in its Periscope, which reads:

"A tooth which is to be crowned should never be filled with cement when the carious portion lies anywhere near the gum line, because that cement is sure to become disintegrated by the fluids of the mouth, and some day the crown will either come off because of the disintegrated cement or the tooth will need to be removed entirely because of recurring caries under the crown. In such cases amalgam should be used."

It is my understanding that orthodoxy in crown construction calls for carrying the band of a crown to and slightly beyond any cavity margins, but even without this precaution, I know of several brands of cement with which such fillings might be exposed with safety.

In the discussion of Dr. Conzett's paper—"The Gold Inlay" N. D. A. in *The Cosmos*, December, 1910, page 1369—Dr. Gallie says: "In my opinion we cannot place full confidence in this operation until in some way we have overcome the weakness of the cement, and have some one produce

a cement that can be relied upon." Dr. Conzett says in another paper on the same subject when shrinkage of the gold inlay is considered (*Items of Interest*, July, 1911, p. 487), "It is true that the cements now given us by the manufacturers are of so good a quality that they will preserve a tooth for a long time, even though there is a slight discrepancy between inlay and filling, but it is not a safe proposition to stake one's reputation upon; therefore I prefer to take the safe side and form the inlay with gold in as small a mass as possible consistent with the best results. This only applies to very large masses, as I have said, for in the ordinary inlay the contraction is negligible." Although a bit foreign to the subject I cannot refrain from saying that if the large and complicated (sometimes compound) inlays were cast in sections and soldered together, this contraction, and resulting misfit would be obviated.

The advisability of some operations does hinge on the dependability of cement, and I feel that the advisability of cementation of a large class of fixtures was settled more than a decade since by some of the pioneers in the making of metallic inlays by the burnished matrix, thus paving the way for the Taggart, Barnes and Alexander methods.

I feel quite sufficiently sure that there has been a marked improvement in the cements of this class year by year since the beginning of their use, and that were crown and inlay operations commendable in their construction in proportion to the possibility of safe cementation, and were the safe cementation assured by intelligent selection and use of available cements, the patient would be very satisfactorily served.

Oxyphosphate of zinc cements cannot be made proof against mismanagement, and it can be said that a quick-setting cement is in more danger from mismanagement than one of slow-setting tendencies. For this reason it is to be regretted, to an extent, that the satisfactory behavior, under favorable conditions, of certain quick-setting cements has so impressed many operators that it is difficult to successfully argue the need of eclectic use of quick and slow setting products. In an eclectic use, the operator should be possessed not only of a knowledge of the working properties of different proprietary products, but, if it happens that an operation calls for properties found in the liquid of one product, and not in the powder of that product, but in that of the product of another manufacturer, he will be much nearer a master of the situation if he has experimentally blended these

different ingredients and is familiar with the results of all such blends. Pay no attention to the "Caution" often offered, "do not use any other liquid with this powder" or "do not use any other powder with this liquid," but consider that it is quite possible that advantages may accrue from such blends. There is no fatal incompatibility between any cement liquid and the powder of any other cement of the same class. There is only to be considered whether the result of a blend is a desirable one.

A definite combination of a liquid of a certain composition and specific gravity, with a powder of a certain composition and fineness of comminution may be ideal for a certain class of operations under certain conditions, but far from ideal for other classes of operations.

The liquids and powders of different cements may be classified to advantage in groups according to similarities. Justi, Eisfelder, Harvard and Ames "D" liquids are so similar that they might be used interchangeably. Ames' "C" and Caulk's more recent liquids are similar. Ames' "A" and Fellowship liquid are similar. The first group give slow, the second medium, and third, quick-setting, if mixed with a given zinc oxide powder. Silex Email liquid and Ames' "E" are similar. Classification of cement powders would place Justi's, Eisfelder's and Silex Email together as not very finely ground heavy zinc oxide. Harvard powder having the heavy zinc oxide considerably modified by silicious material, and having in addition a phosphatic modification places it in a class of its own. Ames' Crown and Bridge and Caulk's Improved Petroid and Caulk's Crown and Bridge powders are somewhat similar in pigmentation and fineness of division. I cannot class the Fellowship powders with any other here mentioned.

In the use of the word similar, I do not mean to convey that these similarities are in all cases definite. Two powders, for instance, might be so similar in composition, fineness of division, and in pigmentation that little difference would be noticeable in the mix, and yet one would result in a mass of satisfactory density and toughness, and the other a mass more or less dense, but very brittle. One might be safe at a cervical margin and the other hazardous. In this connection it is well to mention that a brittle cement is apt to show shrinkage during setting.

I am accustomed to seeing tests of breaking stress of cements appearing quite similar in the mix, in which one breaks at about 100 lbs. into a large number of small particles, while another stands 150 lbs., and in breaking gives only three or four parts, showing greater integrity with less brittleness.

This classification of similarities ought to be of assistance to any operator wishing to observe the results of making mixtures of the powders and liquids of various products. For instance, the Harvard cement entire, or that powder with Justi, Eislefelders or Ames "D" liquid gives plasticity which might be considered very satisfactory, when mixed stiff for filling. These mixtures for filling purposes might be considered almost ideal were a percentage of such a powder as the Ames Crown and Bridge blended into the mixture to the extent of 25% to add a sufficiently impalpable binder, the coarse powder needing such a blend. It is my impression that Harvard powder produced today is not as fine as it was at the time of its introduction. For giving a plasticity suited to crown or inlay setting, the Harvard, Justi, Eislefelders and Silex Email cements, seem to me to be far from ideal, because of the comparatively coarse condition of the powders. The Justi, Eislefelders, Harvard and Ames "D" liquid, mixed with such a powder as the Ames Crown and Bridge, will result in a mass of very smooth plasticity, moderately slow setting tendencies, and decided adhesiveness without an observable degree of expansion during setting. Following out this blending in the direction of quick-setting combinations through that obtained by mixing a finely ground powder with such a liquid as the Ames "C" or the Silex Email for moderately quick setting in crown setting operations favorable to quick setting, and farther to the use of liquids giving still quicker setting warranted and called for in operations which can only be successful with such quick setting, you will have seen results which must perforce be of service to you in using such cements as demanded by the case in hand.

If I can by this effort convert a considerable number of operators to having at hand the requisite variety of cement powders and liquids for this eclectic practice, I will feel repaid.

I have said that a slow setting cement is less apt to suffer from mismanagement than one with quick setting tendencies. A

cement with quick setting tendencies is mostly in danger of being mismanaged under such unfavorable conditions as extreme heat and humidity, therefore, a cement with *slow setting tendencies* must be relied on during the prevalence of the worst external governing conditions. In addition operators in countries subject to extreme summer heat find that a very early morning appointment is the most satisfactory means of minimizing the difficulties of a complicated cement operation in midsummer. Low temperatures are easily managed.

While our subject is oxyphosphate cements we have needed to occupy so much time over the zinc class that oxyphosphate of copper must be excluded from further mention.

I have no doubt that silicious oxyphosphates are uppermost in your minds, as the signs of the times point to the silicious cement question being one of almost paramount importance. Such a material is ideal if reliable.

You have been informed that these cements are oxyphosphates depending on calcium as the potent cement making ingredient. Formulas more or less explicitly and more or less correctly given in patent specifications make the ingredients of these compounds calcium and aluminum silicates with in one case a modification consisting of the silicate of a rare element.

Phenakit (German), Phenacite (English), is a natural beryllium silicate found in localities widely scattered. The name Phenakit applied to a cement would naturally suggest a beryllium content. I do not know what is claimed by the makers of this silicious cement. I can only say that there is not enough of this element contained in any form to show in an analysis.

The name Berylite in connection with a silicious cement giving translucency as compared to a zinc preparation but not having sufficient translucency to become popular, was not intended to indicate a beryllium content. The name was adopted before the beryllium argument had been sprung, and was chosen as an euphonious term indicating jewel-like texture.

I happen to be in position to offer the opinion that when any maker advances a claim in regard to Beryllium or any other rare element being a controlling factor making for superiority and supremacy, it is merely grand-stand play, and that the rare element simply replaces aluminum without advantage except from the advertising standpoint.

The manufacturers of the latest silicious cement aspiring to prominence lay most stress on synthetic preparation being the greatest assurance of a safe and useful material, because of greater assurance of purity of ingredients. Given a commendable formula and manufacturing technic, purity of ingredients *will* save the manufacturer and user many annoyances and apologies. Iron, so prevalent in nature, is the bane of the producer of silicious cements. In the production of powders for oxyphosphate of zinc a considerable trace of iron, nickel, bismuth or lead may be contained in a compound oxide without danger of contributing dark colored sulphides, while any of these prevalent impurities as oxides or silicates as produced in nature's laboratory are fatal when contained in a dental silicious oxyphosphate because of the objectionable complexion of the sulphide of any of these metals and the inevitable formation of the sulphide under oral conditions. It is astonishing that one preparation, the Ascher, otherwise showing evidence of a carefully worked out formula and careful technic in compounding should yet show that this matter of freedom from the elements yielding these objectionable sulphides has not been secured. In this instance it is difficult to believe that compounds of these metals have not been used as pigments, as the plain white unpigmented material is practically free of discoloration in the mouth and all departures from this plain white show discoloration more or less seriously.

Admitting that silicious cements may be so compounded that no objectionable complexion will develop, the question then arises whether the frequent death of pulps beneath such cements is a necessary result of the use of the material or an unnecessary accident preventable by proper operative procedure. The natural early belief was that this pulp poisoning was from an arsenical ingredient. It is not reasonable to suppose that arsenic in any form would be contained in a material of this nature, and analyses do not show any such contamination. The most reasonable suspicion is that conditions during setting are favorable to pulp irritation from the phosphoric acid.

Translucency of these cements is apt to depend on fusibility of the powder, and fusibility has been obtained by either a phosphate or fluoride ingredient. A phosphatic ingredient in a cement powder is necessarily conducive to slow setting, and slow

setting with its continued free acid condition is a menace to a vital pulp.

Quickened setting as obtained by elevated temperatures with any of these silicious cements cannot be considered detrimental, but on the contrary I believe it is beneficial from the standpoint of integrity of mass. A quickened setting will in all probability lessen the danger of pulp devitalization.

The paper of Dr. Max Kulka as translated for *The Items of Interest*, May, 1911, has much to say on electrolytic dissociation, hydrolysis and ionization. After many abstruse chemical arguments he shows the possibility of penetration of plates of ivory by phosphoric acid and that free phosphoric acid is in evidence in some mixed silicious cements for a longer period than in some others, making the deduction that safety of the dental pulp depends on prompt and complete setting.

I happened to ascertain some years since that various fluo-silicates gave cement making properties with zinc oxid and astonishingly rapid setting with silicious cement powders. These fluo-silicates used in conjunction with a heavy acid phosphate solution proved valuable as the liquid element of the material called Berylite, it being possible by varying the proportion of the two solutions to obtain any setting quality desired. While for various reasons I have not been hasty in seriously offering a silicious cement to the profession, I have often suggested the use of this mixture of phosphate and fluo-silicate to be used with powders obtainable. The combination gives improved texture and more definite setting, and therefore greater safety for the tooth pulp along with expedition of the operation. Schoenbeck, Ordell and Phenakit powders may be used in this way.

Prompt setting may be obtained from a very potent powder and a not very energetic liquid or by the reverse of this, or by having the powder and liquid each moderately energetic in cement forming tendencies. In my opinion the latter condition represents the well balanced formula if the setting tendencies allow of mixing to a full puttylike consistency.

The Ascher cement when the use of some of its shades is justified in a clean mouth will set promptly to a dense mass when extra heat is applied, because of powder and liquid each being

moderately active. Harvardid will do the same from having an energetic liquid with a rather inert powder. De Treys' will set promptly from a comparatively plastic mass and too quickly, to a porous mass, after a puttylike mix because of a very active liquid and a very inert powder. Ordell's is a bit slow because of a rather inactive liquid with a powder capable of medium activity. Schoenbeck's is a bit slower than Ordell's for similar reasons. Phenakit is very slow, having a powder capable of moderate activity and a liquid not at all adapted in my opinion to the purpose.

These descriptions of my findings will, I trust, be of some assistance to you.

I have seen results which would indicate that silicious cements obtainable can be depended on for practically permanent results in the classes of cavities in which we most need them, and that in classes of cavities in which we would not expect real permanency because of the stress of mastication, they may be depended upon for a much longer period than any oxyphosphate of zinc.

SOME PROFESSIONAL COMPARISONS.*

BY JAMES McMANUS, D.D.S., HARTFORD, CONN.

One of Boston's quaint and amusing literary celebrities of long ago said that "comparisons are odorous" and with that sentiment in mind, I propose to recall a little history, and make a few comparisons.

As dentists, we may—or possibly we ought—to rejoice when doctors have bouquets thrown to them for their charity service: and dentists are asked what they have done, or what are they doing for the poor. Charity service as given by doctors, and as given by dentists, and the public, deserves a closer study, by all parties, than has generally been given to it. I don't know the name of the first doctor: but may infer that like the practitioners of the present day, he did more or less charity work. We read that a Roman lady named Fabiola, in the fourth century, founded a hospital and the charity planted by that woman's hand overspread the world.

Early in the last century a large number of the men, practicing medicine, never saw the inside of a medical school or college, and they later gave students, not only office instruction, but opportunities to visit patients with them, to observe and study diseases at the bed side in then scattered, individual hospitals.

Seventy-two years ago a majority of the men who had the degree of M. D., were from schools requiring the attendance on only two courses of lectures, and seventy-two years ago, the first dental college in the world was founded by a few dentists, a charity ranking next in importance with the first hospital founded not by a doctor, but by a woman of blessed memory. Keep in mind that all hospitals since founded have been maintained by state and city appropriations, generous public contributions from men, women and children, and fees from patients ranging from two to twenty or more dollars a week.

Hospitals and hospital service are believed by many to be medical charities. Close study and observation tell the story that they are charitable to the very poor and a favored few doctors.

*Read before the Academy of Dental Science, Boston, Oct. 4, 1911.

From the many medical colleges of the country a few honor graduates that have influential friends are given hospital appointments each year. These young doctors for three years have been attending lectures and clinics at an expense of from five hundred to one thousand dollars each year. Now on, from one to two years or more the hospital appointment gives them advanced and practical post graduate instruction at the bedside of patients under the guidance of doctors of long and large experience, with the added hospital facilities, medicine, stimulants, appliances, the best of food, trained nurses at hand at all hours. In reality they are given a home in an institution where they can pursue their studies and quickly gain experience and confidence. All these advantages with board and lodging included, and in some cases a small salary, is the good fortune of these young doctors, who are supposed to be, and generally are credited with doing charity work.

There are few doctors, young or old, rich or poor, but would gladly accept if offered to them, considering it an honor, an appointment on the staff of their state, city, local or special charity hospital, and such service is supposed by many to be charity work because they receive no money payment for hospital attendance.

Many, if not all hospitals are close communion in their management. Money lavishly spent could not gain the honor, social position, political advancement and newspaper publicity compensation, that surely comes to the doctor who is on the staff of a hospital.

The many opportunities to meet and associate with celebrated visiting doctors, consulting with them at the patients' bed side, and assisting or witnessing eminent surgeons operate: the favors and attention from the internes, and the nurses for special patients they are interested in; their names printed in the yearly hospital reports, which are sent to hospitals all over the world, and which is an endorsement as to skill and character that the public accepts—all these incidentals are far above and beyond any compensation that a generous fee bill would give for the same hours service in general practice.

The reporters assigned to hospitals do not keep in touch with the doctors at large, and if by chance a complimentary notice of their service does get in the papers, they are often charged with unethical advertising.

Medicine and dentistry each has a history dating back to the early centuries. All that enthusiasts, fanatics, priestly ministration, power of the church, government maintenance, and money lavishly bestowed by men women and children, medicine represents to-day. Sixteen centuries ago Fabiola planted the first hospital and only seventy-two years ago a few dentists in Baltimore, Maryland, planted the first dental college, and free dispensary: and they have overspread this country, and will soon overspread the world. Dentistry and dentists unaided by church, government or money donations, held aloof by medical men, if not actually despised as were the early surgeons, has slowly but surely forged ahead, and to-day its schools of instruction rank with, and many are part of the university medical schools of the country. In all dental schools and colleges, since established, in their dispensaries and modest little hospitals, diseased conditions of the mouth and teeth are treated surgically and medically free.

The planting of the first dental college and dispensary in Baltimore, Maryland, is the first one of the many answers to the question: What has dentistry or dentists done for the poor? The fifty or more dental colleges giving free surgical and medical treatment, that have overspread the country since 1840, tell what dentists have done—are now daily doing, and will continue to do for the poor.

The great hospitals of the world munificently endowed by government with frequent generous donations flowing into their treasuries and the weekly payments from patients do not furnish artificial eyes, arms, legs, trusses or other appliances useful, needful or ornamental. While dental colleges founded by a few dentists without assistance from state, city or individual contributions are severely and unjustly criticised for charging a small sum for materials, often precious metals used in the filling of teeth, and in the making of artificial teeth.

The brilliant halo that for years encircled medical schools, has in later years become so broadened and diffused, that the public can see that there are other schools, where the fundamental principles of medicine, science, art, mechanics and manual training are taught, and where students are equally well trained and fitted to practise a specialty of the healing art. The dental course,

adds to the medical, surgical and operative dentistry, mechanical dentistry, metallurgy, orthodontia prosthesis, crown and bridge work and dental ceramics, all these subjects taught in the lecture halls, while a number of hours each week must be spent in the infirmary, making operations or watching others operate under the supervision of demonstrators; and a number of hours each week in the mechanical laboratory where they are taught scientifically and practically how to work gold, silver, platinum and other metals, and materials used in the making of artificial teeth, splints and appliances for fractured jaws, cleft palate, and the many and varied deformities of the teeth and mouth.

Surely the dental course covers a much larger and varied field of instruction than any other special scientific school, and state dental examiners, expect, demand and put dental graduates through a more rigid examination than other state boards.

The medical and dental students at Harvard University, University of Pennsylvania, and University of Michigan during the three years of college life, have equal opportunities, and the same general expenses. The doctors degree is conferred on them by the authority of each state and the university gave tacit recognition of dentistry as a specialty of medicine. With the license from the state examiners, the equality and recognition parts company.

The doctor and dentist have spent from \$1,500 to \$2,000 or more to gain the right to practice their profession, and they decide to locate in the same city or town, and secure office rooms at the same yearly rental. The doctor spends for furnishing neatly reception and consulting rooms, \$100. With a fountain pen or pencil, prescription pads kindly furnished the profession by local druggists, a thermometer, and physicians' samples he is ready for patients, and he is recognized at once and accepted as a doctor. The young doctors start out with an obligation only for rent of office, and his living expenses is all that confronts him the first year. Charity patients are a God send, for they keep him awake, and cost him only advice, and the writing of a prescription. If called out to patients he gets exercise in the open, and the public sees that he is getting patients. He can easily attend to several office charity patients in an hour and to two out

patients, and that charity service would not be exacting either, mentally, physically, or financially, neither would his laundry bills be materially increased or his clothing contaminated by contact with such patients.

In comparison the young dentist pays the same yearly rental of \$100. Furnishes the reception room, operating room and mechanical laboratory, at a cost of at least \$500, and if he is ambitious of an up-to-date operating room, and a bit reckless, he will have incurred an expense of \$1,000 before he can accept patients. In addition the expense of heat, light, electrical power, laundry, and changes in operating apparel will add materially to his expenses. Dental charity calls for time, labor, and materials. What is thought by many to be the simplest dental service—an examination of the mouth, calls for at least fifteen minutes time, and the cleaning of teeth and putting in a simple filling often an hour or more.

The mother or woman friend with the daintily dressed daughter or sister, will hesitate to have her take the operating chair just vacated by a patient whose clothes and general appearance indicates lack of personal cleanliness. The well kept office, and the dress of the dentist attracts and holds the class of patients who think only of their own needs, and prefer to see when in a dental office only the better class of patients.

Few doctors or dentists realize or recall the fact that the first dental college was founded and maintained for years by the charity service of dentists alone: and that all dental colleges are largely doing public charity work in their infirmaries and hospitals to-day. The lives of Doctors Horace H. Hayden, Chapin A. Harris, Jonathan Taft, James Taylor, John H. McQuillan, James E. Garrettson, William H. Atkinson, the members of the first teaching faculty of Harvard, the Boston Dental College and many others, all gave the best part of their professional life cheerfully and devotedly without compensation, and most of the time at a personal outlay that often seriously hampered them financially. Those early instructors made dentistry a profession. The mass of the medical men, especially those poorly qualified, by lack of education, skill, and manual training to practice medicine successfully, were unwilling to give dentistry any

recognition. Now that specialties are coming to the front and cutting rapidly and financially into the practice of medicine, taking prominence as surgery has done, the wisdom of the few dentists in Baltimore, Maryland, that seventy-two years ago established the first college to teach dentistry as a specialty of the healing art, is now forcing full university recognition.

If with the record and experience of centuries, with all the money needful, with the world to call on, and expert scientific, technical and intellectual men to give instruction, the medical schools are open to the criticism Mr. Flexnor has made and given to the public, are not dentists expecting, criticising and demanding too much of dental schools?

In the September number of the "Dental Cosmos" on page 1,048, you may read that a teacher on bacteriology in a dental school, and also a professor of bacteriology and microscopy in a medical school was asked—how the course given to dental students compared with that given to medical students: and his reply was that the dental course "was not worth anything." The professor referred to in that paragraph admitted that he had taken money from dental students and given them in return "what was not worth anything." Money obtained on false pretenses is a criminal offence and one liable to imprisonment. Is it not possible that Prof. Horatio Wood, M.D., had such teachers in mind when he so publicly proclaimed that the dental degree was only one of partial culture, and surely that class of teachers should be driven out of professional associations.

In the Journal of the American Medical Association of September 2, 1911, page 781, it is stated that a course of study for the degree of doctor of ophthalmology has been established in Oxford, England. This move in Oxford will be soon followed in this and other countries, and in less than twenty years other courses will be established and special degrees conferred by new schools conducted along the lines so successfully carried on by dental colleges.

Note the large number of children and adults that are daily seen on our streets, and in public gatherings, with defective and irregular teeth, and the many deplorably disfigured faces, the children that for months and years were tortured, wearing regulating appliances, the great number that suffered from serious nervous

troubles, all due to the ignorance of the doctor who failed in caring for the children during the early years. The doctor's rule is autocratic with mothers and nurses. They can under wise direction see that the child breathes properly through the nasal passages, and does not acquire the habit of thumb sucking, and escapes the annoyance of adenoid growths, and if it seems best can suggest seeking the opinion of a competent dentist.

The illustrated paper by Doctor Price of Cleveland, Ohio, in the August, 1911, number of the "Cosmos" is most worthy of careful study. The great change shown in the arrangement of the teeth and the wonderful improvement of facial expression are truly marvelous when the age of some of the patients are considered, and they all show how much easier for patient and operator these good results might have been gained if attempted at a much earlier age.

For several years the public have been interested and posted in the work done by doctors to stamp out the "white plague." Money has been freely spent, temporary hospitals established and a measure of success reported. A greater crusade under the auspices of the national, state and city dental societies, is the crusade for prevention, one that has been slowly forcing attention, one that easily, surely and inexpensively will safeguard children, insure health and mental and physical development of the children of the future.

Medical and dental colleges under the strain of professional and public criticism must in part change their methods of teaching. Dental colleges do teach surgical and mechanical dentistry in a practical way, and it is pleasant for old time dentists to read the statement made by Dr. Arthur Dean Bevans, of Chicago, Illinois; published in the "Illinois Medical Journal," of August, 1906. He stated "as a matter of fact the dental graduate enters on his actual work of practice very much better prepared to do his work than does the young medical graduate; because the latter is without any training which fits him to meet the conditions as he must find them. The young dentist actually does a lot of clinical work before he graduates." The older dentists know that many were given the honorary M. D., after years of dental practice, and others earned the degree after a two years' course in a dental college and one year added at medical lectures. They also know

that the M.D., degree would not materially add to the worth or fame of J. Foster Flagg, D.D.S., Luther D. Sheperd, D.D.S., or Edward C. Kirk, D.D.S.

The few dentists in the country previous to the opening of the Baltimore Dental College no doubt did occasionally charity work as every dentist does to-day.

The first dental society was organized the same year as the college, 1840. But the first public society clinic was before the American Dental Association, at the meeting in the Crosby Opera House, Chicago, in 1865. There were clinics three days and four appointed to operate each day, making twelve operators: and I had the honor of being one to operate the first day. The clinics given before the many societies of the country in past years have been educational demonstrations of incalculable value. They awaken interest and the spirit of charity shown in caring for the many patients coming from long distances, the many operations performed by expert operators and mechanical artists, the table demonstrations and conferences, all giving and getting the best possible advice and skillful service the country affords.

Before the American Dental Association in 1865, twelve dentists were appointed and each filled a more or less difficult cavity with gold, before from fifty to one hundred dentists, all interested, for it was an innovation, and an opportunity to watch the men from different sections of the country treat their patients. Now at all state meetings there are many operators, surgical and dental at chair and table demonstrations, and at the national meeting in Cleveland, Ohio, there were ten surgical, and over two hundred and fifty chair and table clinics with an attendance of over two thousand dentists. The education and charity work at these meetings with the individual charity of the dentists all over the country, will level up with the much lauded medical men, if they are not actually surpassed. In 1839, one year before the Baltimore College existed or a society was organized, there was one American dental text book published by Dr. Chapin A. Harris. That book might well be classed as a charitable work, for there were few dentists to buy it for many years after. To-day dental text books are numerous and of a very high order, and the magazine literature of dentistry compares well with the literature of any of the professions.

The trio of talented foreigners—Lemaire, Gardette and Hudson, that brought with them the earned title of surgeon dentist, taught Americans surgical and mechanical dentistry as practiced in France, Germany and Ireland, then as now a specialty of the healing art. These dentists were so successful that a few medical men in Baltimore realized that medical students should be given instruction on dental development and dental diseases, and in 1825, Dr. Horace H. Hayden was invited to give a course of dental lectures to the medical students in the University of Maryland. As the lectures were not repeated in that school, or dental lectures given in any other medical school, the advanced broad minded liberal medical men of that day were squelched. A few years later Drs. Hayden, Harris, and others asked for a dental school to be added to the medical school of the university and they were refused because dentistry "was considered of no consequence." This was the first public exhibition of lack of medical foresight and charity. Fifteen years after the dental lectures in the university, a charter for a dental college was asked for and in spite of the great opposition from medical men a charter was granted by the legislature of Maryland and the Baltimore Dental College was opened with Dr. Hayden as president in 1840. Four years after the opening of the Baltimore Dental College, which was making good progress in spite of the opposition of the medical profession, a modest dentist entered the city of Boston enthusiastic and happy because he had demonstrated in his home, that he had discovered an agent that "mastered pain," and he was anxious to demonstrate and give its use free to the medical profession and the world. The reception and treatment Horace Wells, dentist, received, is briefly told in the Boston Gynaecological Journal for May 1870, by Sir James T. Simpson, of London, England, the discoverer of chloroform, in his published reply to a bitter attack made upon him by Dr. Jacob Bigelow, of Boston. It was the last professional article he gave to the public and was dictated while on a sick bed: "An American dentist works out to its practical results the suggestion by Sir Humphrey Davy, published in England half a century before, and which you seem to wish to efface from anaesthetic records, and he travels a long distance to place the important results before the medical school at Boston and some surgeons at the Massachusetts General Hospital, of

Boston. There is a slip in the single experiment allowed him and he is spurned and hooted away. In doing this the medical school of Boston thus delays the whole subject of artificial anaesthesia for a couple of years. Was not the medical school of Boston chargeable with the continuance of operative tortures? Did not your school stamp out—and thus prevent for two years more the most beneficial discovery which has blessed humanity since the primeval days of paradise?" Is it possible that if Horace Wells had been an M. D., and attached to the hospital he would have been so cruelly treated, or that up to the present day so many medical men would persist in withholding the credit due, and so loyally given to his memory by Sir James T. Simpson, the famous surgeon and scientist.

In 1867 there were seven dental colleges in the United States and none in New England. That year the Connecticut State Dental Association asked the authorities of Yale College to add a dental school to the medical department, and they were told if they would furnish ten thousand dollars a school might be started. That same year a few Boston dentists made the same request of the Harvard management and they opened a dental school before the close of the year.

Along in the eighties Yale authorities were again asked to establish a dental school. They gave the committee a hearing and there the incident closed. Yale still plods along, but not alone, for the majority of the medical colleges plod along, accepting students and wofully failing to give them the full instruction they are in honor bound to give. Mothers with faith and confidence depend on the doctor for intelligent guidance in the care of their children. The many cases of irregularity of the teeth, facial deformities, and the too numerous operations for adenoids tell how they have been deceived and the new orthodontia specialists are reaping a harvest from the unfortunate ignorance of the doctors.

The United States government for years cruelly neglected to care for the health and comfort of its soldiers and sailors. That they were valuable when fit for duty, and a great expense and of no value, when unfit, was not considered. The National Dental Association and dentists throughout the country, for more than twenty years, pleaded with congress to appoint army and navy

dentists—only skillful, competent men that could pass a rigid examination to be appointed. This appeal was opposed in season, and out of season by army medical men, and received little support from medical men throughout the country. A few years ago, contract dental surgeons were appointed with no rank or promotion, and while their service was praised and admitted of value, the opposition to giving rank, and promotion was more active and bitter, influenced and led by high rank army and navy medical surgeons. Fortunately there were a few senators and representatives that held the fort and a bill was passed appointing army dental surgeons with the lowest rank, and no promotion. Among the contract dental surgeons were men that had the medical degree—Dr. John S. Marshall, a graduate of medicine, a dentist and oral surgeon of long practice, the author of a text book on surgery, an ex-college professor and a veteran of the civil war, was tainted with mechanical skill, trained fingers and polluted with dental experience, which rendered him ineligible to rank and promotion with army surgeons. The Secretary of War and the President, on account of army service on his age retirement, promoted him to rank of captain. The old time prejudice of medical men, towards those who have manual training, and manipulative skill, rarely fails to assert itself.

The last and most vicious public expression of lack of charity and kindly feeling towards dentists and dentistry, you can read in "Current Literature," August number, page 161. That American magazine allows its pages to be smirched and its readers to be terrorized by a malicious, untruthful defamer of American dentists. Dr. William Hunter, professor in Charing Cross Hospital, London, a pathologist run mad, a guess work scientist, makes the charge that "dentistry as practiced in this country is a curse to the world; the fruitful source of one of the most terrible scourges afflicting the frame of man—'Sepsis.'" He says that dentistry as practiced by even the ablest men in the American profession, is spreading deadly maladies not only among the well-off, but among the very rich. He says the education of dentists is of the most superficial sort. "The dentist goes about his work in dentistry ignorant of such things as therapeutics and infection. He is no scholar and in no sense a man of science." This guess work pathologist has the courage to express his ignorant opinions

but there are too many medical men who ignorantly think as he does, and privately say it.

All the bad and good work, and all the harm done by ignorant and educated dentists will not be a feather's weight in the scales, compared with the thousands of tons weight, charged up to educated skillful men and surgeons for their sins of omission, and commission. The blighted hopes of mothers, the wholesale deliberate murder of unborn children and deaths of the mothers—the neglect of children, and resulting physical deformities: the many and oft repeated surgical operations, purely experimental operations, the deaths from careless administration of anaesthetics, wreckless hypodermic injections and careless giving of powerful drugs and the neglect to prevent infection. All done by ignorant and educated medical men and surgeons—leave dentistry outclassed and unrecognized when the record of professional damning sins is made out.

Dental society meetings are post graduate schools of instruction, medical and scientific men have often been invited to give lectures, talks, demonstrations on subjects that they prefer to talk about. Can any one present recall three cases, where a dentist was invited to lecture, or talk on dental subject before a medical society? Can any dentist present name five occasions where a dentist was officially invited and given a seat of honor at a medical society banquet, and asked to respond to a toast, and can he recall a medical society banquet where there was not either a minister, lawyer, banker, politician, insurance officer, business man, editor and artist present as guests of the society. Dentists have not been and are not considered professional.

The old Baltimore title of D.D.S., can be found in the 1907 edition of the Encyclopedia American and the 1904 and 1906 International Encyclopedias; but the title D.M.D., conferred by the first university in the world (44 years ago), that established a dental department has yet to find place in the lists published in the dictionaries and encyclopedias of scientific and professional titles.

The Journal of the American Medical Association has published for years every week a list of the dates of meetings of twenty-three specialties in medicine, and for years I have looked for the announcement of the annual meeting of the National Den-

tal Association, and it has not yet appeared. A specialty of the healing art, taught in several of our universities, medical colleges and in a dental college for seventy-one years, never has had place in its public announcements of annual gatherings.

Don't for a moment think any personal sniff incited the writing of this paper, for over fifty years I have received the most cordial treatment from members of the medical profession (and years ago I was elected an honorary member of the Hartford County Medical Society). I have no personal grievance.

Reading the articles in the journals and magazines, I have specially called your attention to, and quoted paragraphs from, gave me the text. I feel that it is time for dentists to assert themselves. I hope you will catch on to the spirit and intent, and think often more earnestly and seriously of your personal responsibilities.

The honor is Harvard's for establishing the first university dental college in the world, and the Boston Dental College, now Tufts College Dental School, has a good record for high grade instruction. The wonder grows that these institutions have so little influenced their graduates, and the dentists of New England to work together for the uplift of the dental profession. The National Dental Association with all the actual or fancied faults—that may be charged against its management, does represent to the world the highest type of American dentistry and dentists.

The American Medical Association has generous support and its weekly journal has a large circulation and advertising patronage, and it is all the while competing with the numerous and many successful offshoots from the old school of medicine. There ought to be among the estimated number in the United States, at least five thousand educated professional dentists that should be members of the National Dental Association.

Great efforts were made to have a large meeting of the National Dental Association in Boston in 1908. In the New England states there were registered 3,551 dentists. In Massachusetts there were registered 1,935, including 712 registered in the city of Boston. All told from New England, the full paid members numbered only 90, and of that number, from Boston, only 27 out of 712 dentists, that had a five dollar interest in the representative national association. Surely that is a very poor

showing for the educated, scientific, professional dentists of New England. The small attendance at the meetings of the Stomatological section, of the American Medical Association justified the comments of one of the executive officers, who said "It would be much better if the dentists would give their time, and expend their energies in building up their own national dental associations."

* * * *

I know that I have tired you listening to my "odorous" comparisons, but as a physical tire is often said to benefit one, I trust that to-night's experience, will not delay or disturb your usual rest and sleep.

We can easily change the current of thought: and take immense satisfaction in the great good fortune that has come to Boston. Soon in the beautiful fenway amid trees, shrubs and flowers, a magnificent building and home will stand as an "object lesson" for the world to admire and copy, and when finished there will be nothing on earth to compare with it in architectural, artistic, educational or charitable institutions. The marvellous gift, and the more wonderful co-operation and gifts, of the Brothers Forsyth, to guard, protect and perpetually bless the children of Boston. Their desire to guard and care for children, to give them relief if suffering pain, to make good defective teeth, to correct irregular teeth, to prevent facial disfigurement, to teach children the importance of personal cleanliness, the absolute need of keeping the mouth and teeth clean, if they would have bodily health, and mental vigor—inspired the gift of this great infirmary and ideal dental school: where perpetual crusade will be carried on by competent men and women, preaching and teaching the gospel of prevention—in this home of the greatest, grandest, surest, charity ever given to the world.

THE NEW YORK INSTITUTE OF STOMATOLOGY.

A regular meeting of the New York Institute of Stomatology was held on Tuesday evening, May 2nd, 1911, at the Academy of Medicine, No. 17 West 43rd Street, New York City.

The Vice-President, Dr. MacNaughton, occupied the chair, and called the meeting to order.

Dr. MacNaughton stated that the President, Dr. Davenport, who has been ill, is now on the road to recovery, and is expected soon to be in his usual good health.

The Secretary read the minutes of the last meeting, which were approved.

The Secretary read the report of the Nominating Committee, as follows:

Dr. H. L. Wheeler, for President; Dr. S. H. MacNaughton, for Vice-President; Dr. G. A. Wilson, for Recording Secretary; Dr. J. R. Watson, for Corresponding Secretary; Dr. H. W. Gillett, for Treasurer; Dr. F. L. Bogue, for Editor; Dr. J. M. Howe, for Curator; Dr. J. B. Locherty, for Member of Executive Committee.

Dr. J. R. Watson was appointed as a committee of one, to audit the Treasurer's accounts.

Dr. MacNaughton—One of the honorary associate members of this society—Dr. Charles Stedman Bull—died on April 17th. So far as I know, Dr. Bull attended but one meeting; but he gave us a very valuable paper on the connection of diseases of the eye and teeth.

COMMUNICATIONS ON THEORY AND PRACTICE.

Dr. Gillett—Our fellow member, Dr. G. M. Holden, was in my office this morning, and showed something that I thought would interest the members. It is a cap made to slip over the patient's hair when we operate. One of these is put aside for each patient, and labeled with that patient's name. They are put up in sterilized envelopes, and come to us in that form. I think the S. S. White Co. already have them for sale. Dr.

Holden said these had not yet been shown before any society, and he wanted it to come before us for its initial demonstration. They are labeled "Holden Aseptic Protector," and bid fair to be very helpful.

The following papers were then read, which appear at pp. 289, 297, 323, 334 of this number of the Journal.

DISCUSSION OF PAPERS OF THE EVENING.

Dr. J. Morgan Howe—I think the discussion of the subjects presented this evening must necessarily be very limited. They are statements of facts discovered by investigation, with some interesting, yes marvelous, demonstrations, by Prof. Gies, and a resumé of our literature covering the study that has been made heretofore of the relation of bacteria to dental disease. It is very valuable and when it comes to be printed will enable us to begin to digest it. Our sincere thanks are due Dr. Lothrop, and I am sure go out to him. It is a remarkable presentation in itself, but to be presented by a man who is not a dentist, it shows such a thorough understanding of what has been heretofore recorded as to be unprecedented.

I am sure that we all will be better informed of what has been done or claimed in the study of decay of teeth, after we have studied Dr. Lothrop's paper, than we have been.

I am certain, too, that the facts that have been presented as the results of the work done in Professor Gies' laboratory, under his direction, will lead us nearer to the point which we seek; the understanding of the influences that produce dental decay, and what can be done to lessen them.

Dr. L. C. Leroy—We should not allow this occasion to go by without thanking these gentlemen most heartily for what they have presented. I, too, have felt very much as did Dr. Howe, that the fact of a gentleman coming here—not a dentist—and presenting to us in such concise form a history of our literature upon the subject, is of vital importance. We are very deficient, as scientists; but I presume it is because we are compelled to earn a livelihood, rather than to be investigators, and we have not the opportunities for investigation. From the time we enter

our dental institutions, we get practically no fundamental training that will be of any great value, in later life; and when we are launched out into practice, it is simply as treaters of diseases of the oral cavity.

That we do occasionally have opportunities to reflect, record and to profit as given by these worthy gentlemen is an unusual privilege even for those living in a district such as ours. There are very few places throughout the country that offer the opportunities for post-graduate learning such as large metropolitan centres do. We should be openly grateful. I have had it in mind to send to these gentlemen some specimens, but I understand it was limited to the study of certain conditions, so that I did not wish to transgress upon them without a better understanding of what the requirements of the laboratory are.

Dr. Gies said in Bunting's experiments that the presence of sulphocyanates permitted of no definite deductions as to their origin, and his later remarks as to the administration of the drug to overcome certain conditions, are quite a revelation. I thought the physiological effects had been quite positively determined before the taking up of the administration of the drug.

Of course the problem of tooth decay takes precedence in importance over any other dental malady we have to contend with; but we have been told that after tooth decay has asserted itself, (which has been commonly denominated a disease of childhood) there is usually a period of immunity which follows in the mouths of most adults, and after that, there is a physiological change, and instead of the tooth tissue becoming affected again in any marked degree, the supporting tissues become degenerated, and we have then the establishment of that other serious malady which attacks the very foundations of our dental structures—pyorrhea alveolaris—in one form or another.

What physiological changes take place in the saliva or in the general metabolism which permits of the establishment of this disease, is another question that I hope may be investigated satisfactorily in the near future.

Dr. Leroy moved a vote of thanks to the gentlemen who presented the papers of the evening. The motion was carried.

Ajournment.

G. A. WILSON,
Recording Secretary.

PROCEEDINGS OF THE
MASSACHUSETTS DENTAL SOCIETY.

AT ITS

FORTY-SEVENTH ANNUAL MEETING

HELD AT

Hotel Somerset, Commonwealth Avenue and Fenway,
Boston, Mass., May 11, 12 and 13, 1911.

OPENING SESSION.

The forty-seventh annual meeting of the Massachusetts Dental Society was held at Hotel Somerset, Commonwealth avenue and Fenway, Boston, Mass., Thursday, Friday and Saturday, May 11, 12 and 13, 1911. The clinics were given at the Harvard Dental School, Longwood avenue.

THE FIRST MEETING OF THE BOARD OF COUNCILLORS.

The first session of the meeting of the Board of Councillors at the forty-seventh annual meeting of the Massachusetts Dental Society was called to order by the President, Dr. Carl R. Lindstrom, at the Hotel Somerset, Boston, Mass., at 10 A. M., Thursday, May 11, 1911.

The Secretary, Dr. Charles W. Rodgers, called the roll and the following officers and councillors responded:

President, Carl R. Lindstrom; First Vice-President, Eugene H. Smith; Second Vice-President, William F. Gilman; Secretary, Charles W. Rodgers; Assistant Secretary, A. H. St. Clare Chase; Treasurer, Joseph T. Paul; Editor, C. Edson Abbott; Charles A. Jameson, Elmer C. Patton, John W. Bailey, Samuel A. Hopkins, Murdock C. Smith, Charles E. Parkhurst, Robert Whitehill, Walter I. Brigham, F. S. Belyea, Chas. M. Proctor, William Rice, Waldo E. Boardman, Frank T. Taylor, Frederick O. Kidd, Norman B. Nesbitt, Adolphus F. Wyman, Wm. W. Maxwell, Timothy P. Sullivan, Henry P. Cooke, Roy A. Bush, Warren E. Booker, Roy R. Stimpson, Aurelius F. Wheeler, Cornelius H. Mack, Newton Morgan, Geo. A. Maxfield, Michael W. Flynn, William A. Fallon.

The Secretary then read the minutes of the last annual meeting, which were approved as read.

The first business was the nomination of officers for the ensuing year. Dr. Boardman moved that a committee of six be appointed by the chair to bring in a list of nominations, said committee to consist of two members from the Metropolitan and one each from the other districts. Carried. The chair appointed Drs. Boardman, Belyea, Dickinson, Cooke, Flynn and Sullivan.

The next business was the selection of the city or town for the forty-eighth annual meeting. Dr. Boardman moved that Boston be chosen. Carried.

REPORTS OF COMMITTEES.

Dr. Boardman, chairman of the Executive Committee and Committee on Printing, reported the printed program of the meeting as the reports of his two committees. Report accepted.

Dr. Frank T. Taylor, chairman of the Exhibit Committee, reported that there was a large exhibit of manufacturers and dealers at the meeting and that manufacturers of remedial and prophylactic preparations were showing a willingness to give the formulas of their products and conform to the rules laid down for the guidance of the committee by the Society. Report accepted.

Committee on Legislation.

In the absence of the chairman of the committee, Dr. Brigham, Dr. Frank T. Taylor reported that the committee had appointed a sub-committee consisting of Drs. Patton, Sullivan and Taylor. This sub-committee got material together so as to find out just what were the laws in the other States of the Union. They looked over the laws very carefully so as to find out what they considered were strong points which were not embodied in our State law. They then drew up an entirely new bill which embodied their acquired knowledge, and after a general meeting of the committee the bill, having been placed before the State Legislature, met with opposition from some members of the committee and Society. The bill met with so many enemies and so few friends that they withdrew the bill from the legislative hearing.

Dr. Taylor asked that the matter be discussed at a general meeting of the Society.

Dr. Charles C. Patton, secretary of the committee, then presented the written report of the committee, which read as follows:

The Legislative Committee of the Massachusetts Dental Society met at Hotel Somerset October 21st, 1910. Frank T. Taylor was chosen chairman and Chas. C. Patton secretary.

Motion was made and seconded that the secretary obtain all information possible to be laid before the committee at its next meeting to enable them to bring about such changes as seemed necessary in our State dental laws. Dr. Taylor and Dr. Sullivan were appointed to act with the secretary in carrying out the instructions of the law.

The next meeting of the committee was held at Boston City Club November 16th, 1910. Upon the resignation of Dr. Taylor as chairman, Dr. Brigham was chosen to fill the office. After a full and free discussion of ways and means the sub-committee was instructed to draw up a bill and bring it before the committee at an adjourned meeting which was held at Boston City Club February 9, 1911.

The bill as drawn up by the sub-committee was freely discussed, and after incorporating the changes suggested the secretary was instructed to have printed and mailed to each member of the Society a copy of this bill, which was done. In this form it was decided to ask for a hearing before the Committee on Public Health, and the date was set for March 6, 1911, at 10 A. M. The committee from the Society was well represented at this hearing, but it was considered advisable to withdraw the bill in its present form and bring it up before the Society for further discussion at its annual meeting.

The Law Committee reported through its chairman, Dr. Edwin H. Kent, and also offered the following amendment:

ARTICLE 6.

LEGAL DEFENSE OF UNJUST MALPRACTICE SUITS.

Section 1. Active members of the Society, in good standing, shall be entitled, in accordance with conditions specified in the following sections of this article, to receive, without personal expense therefor, advice and court services, of an attorney or attorneys-at-law in the employ of the Society for the purpose of conducting their defense in any court in the commonwealth when they are unjustly accused of malpractice.

Section 2. Active members of the Society desiring to avail themselves of the privileges provided in this article shall make application therefor, in writing, to the chairman of the Law Committee of the Society, and shall show to his satisfaction that they are members of good standing in the Society, and that all of their pecuniary obligations to the Society by way of dues and assessments have been duly discharged. They shall also furnish the chairman of the Law Committee, at his request, with a complete and accurate statement of their connection with and treatment of persons upon which complaints against them are based, giving dates of treatments, names and addresses of persons cognizant of facts and circumstances necessary to a clear and definite understanding of all matters in question, and shall furnish such other relevant information, if possible, as may be required of them by the chairman of the Law Committee, or the attorney of the Society.

Section 3. They shall agree not to compromise the complaints against them nor to make settlement of them in any manner without the advice or consent of the Society given through its attorney, nor shall they employ other counsel to aid them in their defense without the consent of the Society.

Section 4. In the event that they shall, without the advice or consent of the Society, determine to settle or compromise complaints against them, they shall reimburse the Society for the expense incurred in undertaking their defense, and in default thereof they shall be deprived of further privileges coming within the provisions of this article.

Section 5. In the event that members of the Society make requests under the provisions hereof, the Law Committee shall have the power to grant the same, or for cause to reject them, as the case may be, and to make such further provisions or requirements as may be deemed necessary for carrying out the purpose and intent of this article.

Section 6. The Society shall not assume any responsibility for payment of sums agreed upon by arbitration in the settlement of complaints, or awarded by court verdicts, or for making payments for any purpose whatsoever, except as specified in this article.

Proposed to—

- Change title of present Article 6 to Article 7.
- Change title of present Article VII. to Article VIII.
- Change title of present Article VIII. to Article IX.
- Change title of present Article IX. to X.
- Change title of present Article X. to Article XI.
- Change title of present Article XI. to Article XII.
- Change title of present Article XII. to Article XIII.

DISCUSSION.

Dr. T. P. Sullivan—Supposing a dentist is injured who is a member of some accident and liability insurance company. He has his own counsel. Can he use him?

Dr. Kent—Co-operation can be easily arranged for.

Dr. Sullivan—That would be perfectly satisfactory.

Dr. M. C. Smith—I think in the large majority of cases it is the physician who puts the patient up to sue the dentist. To illustrate, I will cite a case where a physician made a mistake in attempting to control after hemorrhage and tried to clear himself in the eyes of the patient by putting him up to sue the dentist who had done the original operation. If the State Society were behind the dentist this would not be. On the whole, I blame medical men more for these lawsuits than I do the revenge of the patients.

Motion. Carried.

That the Society have this printed as an amendment to be offered at the next annual meeting.

The Necrology Committee reported through its chairman, Secretary C. W. Rodgers, who read notices of the deaths of Drs. Edwin W. Branigan, Boston, March 23, 1911; Metropolitan District.

Ammon F. Davenport, North Adams, February 17, 1911; Valley District.

Arthur B. Mudge, Lynn, December 26, 1910; Metropolitan District.

Phineas P. Nichols, Bermuda, March 7, 1911; Valley District.

Luther D. Shepard, Boston, January 26, 1911; Metropolitan District, and read resolutions concerning Drs. Shepard and Branigan.

Report accepted.

The Hygiene Council reported through Dr. Samuel A. Hopkins.

The Dental Hygiene Council has had an active winter. The State Dental Society may well feel proud of the work. Here in Massachusetts was gathered together the first Hygiene Council of this country. The work has been that of helping other organizations to form and build up. We have sent out literature to almost every corner of the world. It has been asked for in Japan and South America and we have sent it freely. The Council is under the careful guidance of Dr. Potter, chairman, and the secretary has been very active the past year. We have been hampered because we have not had the money to carry on the work. That was due to an oversight last year in failing to ask for an appropriation as was done the year before. We are about to ask the Society for a liberal appropriation this year to carry on this work.

Motion, That the report be accepted. Carried.

The Editor's report was then given by Dr. C. Edson Abbott, Franklin.

Dr. C. Edson Abbott—In making this my second annual report, I desire to urge that the stand we have taken for independent journalism be continued. When we see one trade journal having in one issue paid advertisements, society reports and dis-

cussions and editorials all in behalf of an attempt to foist the process patent on the dental profession, we realize anew the necessity for independent, untrammelled journalism serving the profession alone. Your incoming President, Dr. E. H. Smith, believes in the Journal. Your editor believes that the different societies might furnish us more analyses of drugs and filling materials for publication. He believes that the full Council proceedings and the full general session meetings should be published in the Journal, so that each member of the Massachusetts Dental Society may discuss intelligently our needs. He believes that the ground already gained should be maintained until the National Journal is full fledged and if the Society votes to publish its proceedings in the Journal next year he intends to visit the New York brethren and see if more advertising and features of interest may not make the Journal increasingly interesting. The maintenance of the Journal means much more work for the editors of the associate societies. Surely the Massachusetts Dental Society can do its part by supporting us with their membership.

It was moved that the report be accepted. Carried.

President Lindstrom then announced as the next order of business the report of the Special Committees.

The Special Committee on Tuberculosis and Other Preventable Diseases, through Dr. Murdoch C. Smith, chairman.

To the Massachusetts Dental Society.

GENTLEMEN:—Your Committee on Tuberculosis and Other Preventable Diseases beg leave to make the following report:

Tuberculosis has been strenuously fought by the medical men and in fact by all the charitable workers, until tuberculosis has become the popular disease and is good stock in trade for those who are trying to make a living without work; still probably satisfactory results have been reached for the year's work.

606 has been the most advertised and most lauded of all remedies as a sure and only cure for the *Spirochaeta Pallida*. The results have somewhat disappointed the early enthusiast. It will probably take its place as one of the cures for syphilis; still there is some doubt if the results are much, if any, better than the 4 to

5 gr. doses intraveniously of some of the mercury salts. 606 has by no means displaced the old sheet anchor mercury in syphilis. 606, if given in the early stages of the disease, may materially shorten the time of violent infection.

Pneumonia. There has been but little advance in the treatment of that disease. The vaccine treatment has not been the success that was fondly hoped for; probably it is not used early enough.

Britain has been busy with the sleeping sickness and seems to have learned its habits pretty well, and at the present time is fairly well able to cope with it. They have done good work along the line of intestinal parasites in animals and man. They have continued their work on Asiatic cholera.

China has awakened to the necessity of fighting the bubonic plague and has enacted stricter quarantine laws than any other country and seemingly is able to deal with that dread disease.

Japan is working on Berri Berri.

Italy has practically demonstrated that pelagra does not come from a disease of corn.

Brazil is working on yellow fever.

Germany is hoeing corn. The German people are making new medicines and drugs to sell to the rest of the world, and many of them are good.

Our own government is doing a tremendous work along many lines, but under a misleading head, as most of the work is being done under the Department of Agriculture, and unless one looks for it there he is not likely to find what is going on.

Under the head of plant pathology they are studying the poisonous plants that grow in this country, many of which are native and some imported. A poisonous plant growing on the desert is one thing, but when it changes its environment and gets near an irrigating ditch it may become something entirely different. They are studying plants that are poisonous to animals and fowls, poisonous to their existence or to their flesh and render it unfit for food, poisonous weeds that are eaten by cows and through their milk are poisonous to infants. Some plants are poisonous as soon as they emerge from the ground, others while they are in bloom and others at seed time.

The Department of Pure Foods is at work in many problems regarding adulterated foods, doctored foods, straight foods and cooked foods.

The mosquito has been elevated to the dignity of a full recognition by this government, and now it is declared that the common house fly will have to go.

During the year practically a new disease has been demonstrated that is an irritation of the lungs and bronchi due to the hair of the brown tail moths.

The hook worm and other intestinal orders have been ably looked after under the direction of Dr. Styles. He is making special efforts to instill into the residents of the country the necessity of better sanitary conditions.

We can all feel proud of the work that is being done by our government all along the line, work that will have far-reaching results, and if any of the dental men want to add their little toward the investigation of disease I would suggest that they take up Pneumococci and study its relation to pneumococci of the lungs. Is it a twin brother or is it the same rascal only taking on a little different virulence and invading the lungs and other parts when before it was satisfied with a home in the mouth?

The care of the mouth has received its due recognition and consideration and is beginning to be thought a great factor in preventive medicine.

M. C. SMITH.

The Special Committee on Dental Education reported as follows through Dr. Murdock C. Smith, chairman:

BOSTON, May 11, 1911.

To the Massachusetts Dental Society.

GENTLEMEN:—Your Committee on Dental Education was duly called together and after considerable discussion the following program of lectures was arranged, and meeting with so cordial a reception, decided to continue the course during the season of 1911.

An extra lecture was given by Prof. H. H. Germain, which was greatly appreciated by the class.

Your committee takes pleasure in moving a vote of thanks of this Society as a little appreciation of the favors that they have

received from the following institutions and professors connected with those schools: The Boston University Medical School and Professor W. H. Watters; the Tufts Dental School and the following professors:

Professor George A. Bates,

Professor Timothy Leary.

Professor Balch,

Professor H. H. Germain.

Your committee was most cordially received wherever they went looking for lectures for the courses, every person and institution appealed to were most enthusiastic in their assistance, and in fact we could have procured lecturers of high standing for many times the number of lectures given, and we can assure you there is no lack of lecturers for any course your committee may deem advisable to have in the future.

Your committee beg leave to make the following suggestion: As this is the age for advancement all along the line of higher education, it is about time that this Society do something more than what has been done in the past, and we would recommend that the Massachusetts Dental Society appoint a committee to report at the next annual meeting as to the advisability of organizing a Post Graduate School of dentistry, independent from the present Dental Schools. There are men enough in Greater Boston to equip such a school and equip it well, providing the available material from all sources could be welded harmoniously, which I think could be done under this Society. Gentlemen, do you realize the wealth of material we have in our midst available for such a school? Harvard University, with all its departments, especially its Medical School; Tufts Dental School, with its well equipped vaccine laboratory; Boston University, with its especially well running Pathological laboratory; Massachusetts Inst. of Tech.; M. G. H., the City Hospital, with all their clinics, and in another year we hope to see the Forsyth Infirmary in running order. What more could be desired for a Post Graduate Dental School? Under a P. G. D. S. we might have a department where

those of us who have patients whose disease we cannot diagnose could bring them for counsel and advice.

(Signed)

M. C. SMITH,

F. S. BELYEA,

J. M. BAILEY,

A. R. BROWN.

Supplementary report of Committee on Dental Education:

Through efforts of your committee the Harvard Dental School has signified its willingness to give two complete courses in post graduate studies during the coming winter.

First. A course in Technical Dentistry.

Second. A course in medical subjects of interest to those practicing dentistry.

These courses will be given at a very moderate cost to the members of this Society, and will be so arranged that one or both may be taken by any individual.

F. S. BELYEA, for the Committee.

A supplementary report was made by Dr. F. S. Belyea, as follows:

I have signed this report in order to make it unanimous. Yet I believe as a result of my experience on this committee that it will be hard to find men to carry on a big course. I am pleased to report that the Harvard Dental School will have, in addition to last year's course, a medical course, pure and simple, so that this year a dentist can take one or both courses as he decides.

A motion was made that the report be accepted and a committee appointed by the chair to consider it. Carried.

Motion. That the supplementary report by Dr. Belyea be presented to the general session.

The Special Committee on Dental Research was asked for its report, in reply to which Secretary Rodgers read the letter from H. Carlton Smith, chairman, stating that Dr. Carlton Smith recommended that "if possible the Society adopt somewhat the methods of the N. Y. Institute of Stomatology; that it appoint

a committee of three or five and make a small appropriation with which they can have routine work done along some lines which they may select."

It was moved to accept the report and adopt the recommendations of the committee. Carried.

The Special Committee on New District reported through its chairman, Dr. Charles W. Partridge.

Out of twenty-eight replies to circular letters sent by your committee to Essex County members, twenty-one opposed a new district, seven favored it.

Railroad connections were such that nowhere could a meeting be held where all could attend and get home the same night. There are already several local societies. A new district society is not advisable.

Motion. That the report be accepted and placed on file. Carried.

DISCUSSION.

Dr. M. C. Smith—The geographical position of Essex County makes it necessary to make two societies if any are to be formed. The only way in which we could meet without being away over night would be to meet in Boston.

The Committee on Registration in Dentistry reported through its chairman, Dr. Ned Stanley.

Motion. That the report of the committee be accepted. Carried.

Dr. Waldo E. Boardman then offered a motion that the Committee on Board of Registration be abolished.

Dr. Taylor—It seems to me that it would be more dignified to keep out until our advice is asked.

Previous motion carried.

President Lindstrom then called for the report of the District Societies.

Motion. That John A. Watts and Geo. D. Richmond be placed on the corresponding list. Carried.

The reports of the various districts, sent by their secretaries to Secretary Rodgers, were then read, but with some other valuable reports are with regret necessarily omitted from this report.

President Lindstrom declared the various reports accepted.

Moved that Dr. Leroy Johnson be transferred to the Valley District from the Western District, dating from April 7, 1911. Carried.

Dr. Wm. M. Flynn—I move that the membership of the Western District be reported as of the Valley District, the program being a misprint. Carried.

On motion the dues of Dr. Jesse Porter, of Chicopee, were remitted for 1912.

The report of the Committee on Miller Memorial was read by Secretary Rodgers, acknowledging the receipt of \$100 voted at last annual meeting.

President Lindstrom again announced as a Committee on Nomination Dr. Waldo E. Boardman, Dr. F. S. Belyea, Dr. E. B. Dickinson, Dr. H. P. Cook, Dr. M. W. Flynn and Dr. T. P. Sullivan, who retired for deliberation.

The Secretary then read a letter from the Boston 1915 organization asking if the Society was interested in the matter of a proposed new building for Civic, Professional, Fraternal, etc., Societies. The Secretary moved that the matter be referred to the Metropolitan District Secretary. Carried.

Dr. George A. Maxfield moved that a vote of thanks be tendered to Harvard Dental School for the use of the school building for clinics. Carried.

The Dean of the Harvard Dental School, Dr. Eugene H. Smith, being present, accepted the thanks in behalf of the school and said that the school authorities were honored by having the Massachusetts Dental Society in the building for its clinics.

The Secretary read a communication from the Dental Educational Council of America, telling of its organization, the work which they proposed doing for the betterment of teaching in dental colleges and asking for an appropriation of twenty-five dollars.

Motion by Dr. Geo. E. Mitchell. That the sum of twenty-five dollars be appropriated to the Dental Educational Council of America. Carried.

Motion to adjourn subject to the call of the President. Carried.

The President called the Councillors to order, and the Secretary, upon request, moved that the President appoint a committee to consider the recommendation embodied in the report of Dr. M. C. Smith, chairman of the Committee on Education, pertaining to the advisability of organizing a Post Graduate School of Dentistry under the auspices of the Massachusetts Dental Society. Carried.

The Treasurer, Dr. Joseph T. Paul, then submitted his annual report as follows:

Dr.

To Balance to new account, June 13, 1911.....\$1,901.90
To Cash received during the year as follows:

Dr.

To Balance	\$1,901.90
" Dues from Western District for 1910....\$	24.00
" Fees from Sec. for Membership Certificates	6.00
" Sale of Tickets for Dinner at Mt. Tom...	180.00
" Fees from Exhibit Com. 1910 and 1911...	620.83
" Interest on Balances.....	19.03
" Dues from Central District, 1911.....	94.00
" Dues from So. Eastern District, 1911....	210.00
" Dues from Metropolitan District, 1911....	688.00
	<hr/> \$1,841.86
	<hr/> \$3,743.76

Cr.

By Cash, Salaries of Editor and Secretary....\$	50.00
" Stereopticon	8.00
" Stenographer	31.40
" Rent of Hall.....	70.00
" Legal Services (McGough).....	30.00
" Engrossing Diplomas	1.00

" Polk's Dental Register for Secretary.....	5.00
" Flowers, Dr. Branigan.....	5.00
" Carpentering	2.76
" Fares and Dinners Mt. Tom.....	298.75
" Special Cars to Mt. Tom.....	68.05
" American Miller Memorial.....	100.00
" Printing	469.60
" Account "The Journal".....	161.62
" Clinicians' Expenses	298.92
" Committees' Expenses	276.00
	<hr/> \$1,867.10
" Cash Balance	1,876.66
	<hr/> \$3,743.76

Boston, Mass., May 10, 1911.

Motion that the report be accepted. Carried.

The Committee on Nomination of Officers for ensuing year then presented the following list of candidates:

President, Eugene H. Smith, Boston; First Vice-President, Almond F. Townsend, Worcester; Second Vice-President, Michael W. Flynn, Pittsfield; Secretary, Charles W. Rodgers, Dorchester; Assistant Secretary, A. H. St. Claire Chase, Everett; Treasurer, Joseph T. Paul, Boston; Editor, C. Edson Abbott, Franklin.

Dr. Boardman moved that the report be accepted and that the Secretary be instructed to cast one ballot for the entire list as reported by the committee. Carried.

The Secretary cast the ballot and the President, Dr. Lindstrom, declared the above mentioned gentlemen elected as officers of the Society for the ensuing year.

Dr. W. E. Boardman read a communication addressed to the Society from Dr. H. C. Brown, chairman of the Committee on Reorganization of the National Dental Association.

Dr. Boardman moved that the letter be received and a representative and alternate be appointed to represent the Society at the N. D. A., Cleveland, July, 1911, to assist in formulating a

constitution and by-laws for the National so that it could become a more representative body and be able to publish a journal. Carried. (Dr. Boardman appointed.)

Motion to adjourn subject to the call of the President. Carried.

AFTERNOON SESSION. 2:30 P. M.

President Lindstrom called the meeting of the Massachusetts Dental Society to order and called upon Secretary Rodgers, who read the minutes of the last annual meeting.

Secretary Rodgers then read the Councillors' report of the morning session.

President Lindstrom then called upon Dr. Henry H. Piper, who read the report of the Committee on Dental Dispensaries.

He added, "I wish to add that the Metropolitan Dental Hospital for Children has been incorporated."

Motion. That this report be accepted and placed on record and the Editor be instructed to publish and a sufficient number of publications be sent to school superintendents throughout the State. (This has been done.)

President Lindstrom then called Dr. E. H. Smith to the chair, took the floor and delivered the President's annual address. (To be published in the March issue.)

DISCUSSION.

Dr. Cooke—There are two or three points we might take action upon. One is the question of the dental nurse, to ask the Legislation Committee to get a law through to make it a legal thing. Then in regard to the question of the dispensaries. It would be a good idea to instruct the Committee on Dispensaries to work out a plan during the year for carrying out the work among the school children and bring in a plan next year. Those two points are the most important of the President's address. I do not feel personally willing to pass on the question of a paid secretary. If there are funds it might be a good thing for the Society to do.

Motion. That we request our Committee on Legislation to confer with the State Board of Registration and draft a bill before the next Legislature to make the dental nurse a legal and helpful agent in private practice and the public clinic.

Dr. Brigham—I understand there is no Committee on Legislation.

Dr. Rodgers—There is a Committee on Legislation. The one just abolished was the Committee on Recommendation to the Governor, in appointments to the Board of Registration.

Dr. P. K. Brown—What is this dental nurse to be?

Dr. Cooke—That is the thing for the Committee on Legislation to do and then confer with the State Board of Registration. And then give us a dental nurse that can be used in private practice and public clinics.

Dr. Brown—I do not think it will work advantageously. In general medicine the traveling nurses are called in by physicians and then go ahead and take charge of the case. I think the dental nurses are injuring the dentists. There never was a time when the laboring man received so much as at the present time. Why should the expense of dental treatment be borne by the dentist rather than by the parents of the children?

Dr. Piper—Is the dental profession able to cope with abuse and fraud? If we give up the struggle for the dental nurse we infer that the question is too much for us. I believe it is in the line of true progress.

Dr. Cooke—The more light we have on this question the more the public learns and the more work for the dentist. If the parents of the children are brought to realize the actual conditions and the remedies that may be used, we cannot possibly attend to all the work that is to be done. The physician has been injured, not by the nurse, but by his attitude toward the new things that people demand. Because he has not regarded osteopathy, the Emanuel movement, etc., the regular physician has in some respects lost ground. We cannot solve this question in any other way.

Dr. Chase—It seems to me that the opinion of Dr. Brown is not confirmed by the entire State. The dental nurse would take away only the work we do not want.

Dr. Belyea—I know a great number of medical men, read medical journals, and have had experience in dispensary work. None would go back to the time when he had not the nurse. I know as Dr. Cooke has said that it is utterly hopeless for all the dental organizations in existence to cope with the charity work that is to be done in the needy districts unless we get the aid of the nurse.

Dr. Brigham—I want to sanction as a whole the able address of the President. The dental nurse question is a very serious question. Gentlemen, we cannot do all the work that comes our way. The dental nurse matter would be a beautiful thing if it could be held within bounds. But you are letting down the bars for advertising men to fill whole blocks with nurses. It may be worked out by the aid of the State Board. What we need most to-day is the education of the dentist who is just entering practice.

Dr. Belyea—How is it that the medical men have not found the nurse question to work out as the previous speaker alleges? Our dental laws have been made altogether too much with the quack in mind. The quack will remain until the demand for him ceases. The ethical members are the ones to be considered in making laws for the dental profession.

Dr. Brigham—Our laws of the present day protect the profession much more than the people. They do not prevent the unscrupulous man from carrying on his work.

Dr. Marvel—Do we want a private nurse or do we want a dispensary nurse? Just what harm would this proposal do? We have the quack with us at all times. If the bars are let down the quack will fill up his office with people who will do the preliminary work. Thus our law will be worthless. I will agree that something might be done in the dispensary by way of examination, etc., by certain women in the schools.

Motion by Dr. Boardman. That the matter be referred to the committee. Carried 27-4.

Motion by Dr. Cooke. That we request the Committee on Dental Dispensaries to thoroughly canvass the subject of public school clinics and the care of the teeth of school children and report at the next annual meeting.

Motion. That the President's address be accepted and placed on record. Carried.

President Lindstrom then resumed the chair and announced an essay by Dr. George Wood Clapp, New York City; subject, "Meeting Price Competition," which was read by William F. Davis, D. M. D., New York City. (Published in the Digest of ———, 1911.)

Walter I. Brigham, D. D. S., South Framingham, Mass., then read an essay; subject, "Review of Some of the Conditions of Present Day Dentistry," including two quotations from the Cosmos. "The Service Side of Dentistry." (Published on page 339 of this number of THE JOURNAL.

DISCUSSION.

Dr. Hosley—I think the paper is too pessimistic. I believe you do need the teachers. You need the chair of salesmanship. We educate how to do the work, but we do not tell how to sell the services. The men who are demanding good fees and commanding the respect of their communities are the salesmen. Many young men find it hard to know how to show up their goods. The country is prosperous. The dentist needs education. A spirit of good fellowship should be promoted for finding out, "How does the successful man do it?" There is no secret to high fees. It is simply a matter of education. Subscribe to some of the papers on salesmanship published for merchants and get better fees. The man who raises the field of dentistry out of fees is doing the highest work. The best surgeon commands the best prices. It is equally true in dentistry. With the feminine gender nothing appeals more than the beautiful in a piece of work. Increased fees bring in an increased appreciation. It is up to the volunteers of the profession to educate the people up to the appreciation of the wonderful work that is being done for the people at large.

Dr. Brigham—I made no plea for work or prices, but it was the sense of my paper that the people should get better dentistry.

Dr. Hosley—I was discussing the first paper, that of Dr. Clapp.

Dr. Maxfield—I am both progressive and optimistic. We are not getting at the foundation of what the dental and medical profession should work for. The theory is accepted that the decay of the teeth depends upon the environment of the teeth. Any man here knows better. It is a cause, but not the only cause. The vital cause is what we should seek. Do you find anything better to-day than the old soft gold fillings? I do not know of any way we can pass a bill to make a man honest. Recently the President of the State Board of Registration received a letter from the Secretary of State of Massachusetts, requesting that they stop certain dentists from doing poor work. These problems are too great for us to fight. Younger men have got to take the case up and press it.

Dr. Davis, closing the discussion for the first essayist, *Dr. Clapp*—I cannot add anything to the paper. I graduated from Harvard years ago when the medical profession thought dentists only a little better than barbers. The man who goes into a city should have a little dignity and common sense. He will not condescend to price competition. Old Dr. Keith said to his classes, "You never find a rich dentist." There are a large number that do not get as good a living as the plumber or the carpenter gets. Make the people of the community understand that they have got to have a dentist for health. If you go into price competition you will not get good work or get the money you ought to have for doing it. The man who does the work for the least money is going to take the least pains and give the least satisfaction. I do not care whether you do the Black method or not, but do whatever you do rightly. In the paper I said I am not a pessimist. I believe better fees must return.

Dr. Brigham, closing—I live in a town twenty-one miles out. At one time there was only one dentist besides myself. We never have had price competition. We have some very skilful operators and some less so, but we have not an unscrupulous man. But the great trouble is that many men want to get the work done without work. The man who gets the highest fees is apt to take the greatest pains. The dentist beside me said to me that it seems to make no difference to us whether they pay us or not. We have got to have the young men better educated. The many kinds of cement that have been generally used in the last few years have been in

my hands a failure. The young man is handicapped who has never learned to do permanent work.

Adjourned to the evening session.

President Lindstrom called the first evening session at 8 P. M., and declared a recess until 9 P. M., when he introduced the essayist of the evening, Professor B. J. Cigrand, of Chicago, who in felicitous words thanked the audience for the honor of appearing before them, regretted the delay in his train and delivered his paper entitled, "What Dentists have done for other Professions," (to be published in a later number of *THE JOURNAL*), illustrated by 175 beautiful stereopticon views.

The audience listened with the closest attention and frequent applause and one cannot help adding that Professor Cigrand himself was a marked example of dentists who have achieved eminence in many other lines, of natural ability and versatility expressed by means of tremendous virility and system.

DISCUSSION.

Dr. C. W. Rodgers—Dr. Cigrand might have mentioned another dentist who introduced ether, Dr. Morton, of Boston. Then, also, when the picture of Dr. Jonathan Taft, of New York, was shown it called to my mind the most beautiful bust I have ever seen, the bust of David by Dr. Jackson, of New York, first brought out at the University of Michigan, to be later duplicated in bronze. Then in Washington it was Dr. Richard Grady, of the Academy at Annapolis, who introduced the polytechnic courses into the schools of the United States. Last year Dr. Grady sent me a report of the work. While speaking of this matter with reference to our modern life I would like to say a word about the first two or three pictures the doctor showed, those of St. Appolonia and later on the pictures of the Catacombs and later on the picture of the beautiful angels of Heaven. He referred to them as goddesses. Appolonia was a Saint of the Christian Church and not a goddess. The ancient monk was worshipping with a pagan priest, but was a Christian. Paré, the great man who gave us the ligature like Pasteur, and a long list of the men and women who have done so much for us, worshipped before the same crucifix.

Dr. Maxfield—It was Dr. Noble who aided in convicting Webster of the murder of Parkman. His evidence was necessary. He was sent for from the Baltimore Medical College. He hesitated at first, for it was near the end of the school year. Then they sent word to him that they would reimburse him \$100 for coming. He finally decided it was his duty to testify and sent word that he would come back. While on his way to Boston he was passed unknown to him by a messenger who was coming to offer him \$200. He identified the body of the murdered man by the teeth. He afterwards wrote, "But my mind was relieved when before the murderer was executed he confessed the whole affair." In the histories Dr. Keep gets the credit, whereas Prof. Webster would not have been convicted without the testimony of Dr. Noble.

Dr. Bailey—About two weeks ago our local historian, James F. Gettemy, sent me two very interesting advertisements in the Boston Gazette in 1768-1770 by Paul Revere. He says in one of his advertisements that he can fix the teeth just as well as John Baker of Boston.

Dr. Stanley—I think we are easily well paid for waiting one and one-half hours. It ought to stimulate us to regard the divinity within us. Dentistry is a liberal profession, second to none in skill. We must impress this fact upon the people at large, particularly the medical profession.

Dr. B. J. Cigrand (closing)—What first started me on this line of investigation and why the idea of historical investigation so appeals to me is the result of having heard in so many State societies of my own profession and others that our profession is narrow. It has been held generally. I have always thought that our profession is broad. I know of none broader. I will not except law or medicine. I mean just what I say. To be a good dentist you must be mentally and physically in absolute sympathy with suffering humanity. In the second place your hand must completely respond to your sympathy and if a man can be that he is on the highest pedestal that God intended on this earth; to be in positive accord and harmony and to be able with your hands to come in touch with the concord and sympathy of man, to be respected of all men. In dentistry you are able to do something with your hands. It is creation itself. You must

reproduce and bring nervous energy back to the things from which it has been taken away. Does the lawyer or the minister do this? The time must come when not every man can become a member of the profession, when he must have a high school training or a good mental equipment. The time must come when a man may be told in his junior year, "You can not become a dentist." The schools of music of Dresden will not give a diploma to you unless you are a musician. The fact that a man has gone to school a certain number of years is not sufficient. He must be able to do with his hands. Mental equipment alone is not enough. Now this lecture has been asked for all over the country. It tries to tell in a plain way that dentists are broad-minded people. A successful dentist can be a success in anything else. I have said many a time that if a man is a failure in dentistry he can still become a famous lawyer or minister. I should be very much obliged if any of you having data of interest in this matter would communicate this to me.

On motion the society passed a rising vote of thanks for Dr. Cigrand's most inspiring paper.

The society then adjourned till Friday.

A meeting of the Council was held at 12:30 Friday noon at the Harvard Dental School. President Lindstrom brought up the matter of the publication of the Journal and after considerable debate the Council voted down a motion to publish the proceedings in the Cosmos for the coming year and passed a motion to indefinitely postpone.

Editor Abbott said that the society could well afford to sustain the Journal. He had not the slightest animus against any dental journal, but thought the profession ought to have enough enterprise to sustain and publish its own paper. Use develops, disuse atrophies, the functions and powers of men.

The regular session of the Massachusetts Dental Society was called to order at 2 o'clock Friday afternoon by President Lindstrom.

Secretary Rodgers presented a petition signed by seven Councillors to have the publication of the proceedings in the Journal

discontinued and stated his views of the matter as found in the report of the Councillors of the preceding meeting which he read.

DISCUSSION.

Dr. Bailey—I made the motion I did this morning with a perfectly open mind and feel that the matter of giving the proceedings to the Cosmos ought to be put over to the next year.

Motion—That a notice of a proposal to publish the proceedings in the Cosmos be printed in the next Annual Program and be brought up before the general Session.

Dr. Maxfield—I wish I had known that the matter was to be carried over to the next year. It would not be fair to drop the Journal this year, but I, for one, would like to see the matter investigated next year. For myself I like to get the full proceedings, the reports of clinics, the discussions, etc.

Dr. C. Edson Abbott—I wish to again repeat to the general session of the Massachusetts Dental Society what I said before the Council this morning, and to say that our support of independent journalism is not in any spirit of hostility to any other journal; in fact, your editor is a constant subscriber to many of them. I do feel, however, that it is up to a full grown profession to have its own organ for the publication of its own proceedings. The Journal does only what it can afford and is making a steady increase in numbers and strength. Massachusetts of all States should maintain her stand for independence. I promise you on my part increased devotion of the Journal and Society and increased efforts by me on her behalf.

Dr. Hosley—I think that this matter ought to be given careful consideration and I move that Dr. Rodger's petition and Dr. Maxfield's motion be laid on the table.

The vote on the question resulted 20 to 10 in favor of laying the matter on the table.

Dr. Maxfield—Will this be brought up before the full meeting?

Dr. Boardman—This ought to be decided before the next annual meeting.

Dr. Maxfield—I would like to have this matter fully discussed.

President Lindstrom—The matter has been voted upon and is now on the table. To discuss it further it will be necessary to take it from the table.

Dr. Brigham—I desire to raise the point for deliberation that this is an entirely different motion from that which has been passed upon.

Dr. Wheeler—I move that we proceed with the next order of business which is the paper.

Dr. Brigham—We have another important matter to bring before the society in relation to the dental law.

Dr. Werner—I think that these things are what make the meetings so uninteresting. I object to spending further time on these matters.

Dr. Morgan—Some things have to be brought up before the whole society. I think the question of dental legislation is one of these.

Dr. Hosley—We have a guest to whom respect is due.

Motion—That we take up the program and consider these other matters after the essayist has done. Carried.

Dr. Daniel O. M. LeCron, D.D.S., M.D., St. Louis, Mo., then gave a paper entitled, "Present Day Porcelain Work."

(Published in the JOURNAL of June, 1911, page 169.)

DISCUSSION.

Dr. Ned Stanley—We can only talk to this paper. Porcelain has been used for a long time. Every now and then a new cement looms up that is going to take the place of porcelain. Take Asher's enamel. How does it last? The profession cannot rely upon it. I want to get down to the practical side of porcelain. Asher's enamel is not lasting. There is a weak element in it. I believe that the reason for the failures in porcelain lies in the manipulation. With better methods better results will be obtained. It is going to come back and to stay. I believe I am getting good results. I have used it for years in the front of the mouth. I have recently gone into using porcelain by the indirect method. If you prepare your cavity right, obtain an accurate impression with dental lac or Detroit compound, you may send it to an expert and let him do the rest. This will save

you money and time, and time is money. There is no wear and tear to me or the patient. Give the expert the color and he will make the inlay on the copper amalgam die and he will get a beautiful result. The color you send will be reproduced. It seems to me for making corner or labial fillings porcelain is ideal. You can get sufficient undercut for retention and have only a fine line showing.

Dr. Maxfield—The trouble with porcelain is that we have not been expert enough to make inlays whose edges will not check. The patient says, "It was so satisfactory a few years, but the edges get dark with time." It is this result indirectly which has created the great demand for Asher's cement. It does stand on a grinding surface, but will not stand on corners. It is astonishing how Asher's enamel wears in some cases. It might be well if we could do as Dr. Stanley says, send the impression to an expert. Do you ever find that the colors of a tooth and the inlay do not match after a few years? It is these things that have made some of us drop porcelain. When it goes out of the office it is one of the handsomest and most satisfactory fillings you have ever put in.

Dr. Hosley—We have with us a gentleman who is able, artistic and painstaking. I refer to Dr. E. S. Gaylord of the National Dental Association.

Dr. Gaylord—Mr. President and Gentlemen: It gives me great pleasure to meet with you and listen to such an able paper as this of Dr. LeCron. I congratulate you on getting Dr. LeCron so far from home. It would seem from the standpoint I occupy that it would be well nigh impossible to discuss this paper. There must be some part in the discussion to which I would like to take exception. I have been following Dr. LeCron for many years. I am quite ready to endorse the paper as a whole. In discussing this subject I see an endless opportunity for enlarging upon it. It is a subject that has been endorsed or otherwise by all men. Almost everyone has had some particular method for using this material.

Dr. Brigham—I have done a great deal of porcelain work with low fusing bodies. One trouble and one reason porcelain came into disrepute was that our first teachers were wrong. They

gave us to understand that inlays would last in almost any cavity. I saw that I was on the wrong track at first. I blamed myself and tried to eliminate the elements of failure. They told us we could rely upon the cement for retention. That should be relied upon only to the extent of preventing the inlay from moving in the tooth. Our inlays should be retained by parallel walls or by undercuts. I want to speak a little of the use of Jenkin's porcelain. It is a most wonderful substance. Its adaptability, ease of manipulation, rapidity of working quality are all that you can ask for. Several gentlemen have spoken of the indirect method of getting the matrix. I have discarded that entirely. I did take an impression two or three days ago because I thought I could get the impression quicker than I could get the matrix direct. In 99 cases out of 100 I do not wish to use the indirect method. What finer model can you find than the cavity itself? I take number 30 rolled gold and run it through my rolling mill down to 1/2000 part of an inch. Adapt to the cavity with wet cotton, fill it with Rutherford's sticky wax to retain it in place, remove it from the cavity and you have an exact matrix to work from. One advantage in having a gold matrix is that you can use dovetails and get the matrix out better than the impression. I might want to return it after the first baking and it might be difficult to do. In the preparations of cavities in the anterior teeth or the preparation on the lingual surface, cut away the lingual enamel wall from the corner of the cavity. Then if you cut a little groove down from the cervical wall to the incisal edge the matrix will come out lingually and when the inlay is set the inlay cannot be pushed out laterally. I have used a large amount of porcelain in the posterior teeth. It is a most ideal filling in the large open cavities that we see in the distal of cuspids. You can contour them out to perfection if you have the large labial wall to back the filling under. As far as the esthetic goes you are not obliged to consider color in this place. In the molars you can put in large inlays with perfect color and have ideal results. The rapidity with which you can use Jenkin's porcelain is pleasing. I have put in two approximal cavities in one hour and forty minutes. It would be difficult, I think, to do it with higher fusing bodies. I would much rather do it myself than to spend the time in doing the package up and

addressing it. In bridgework I have used all-porcelain only a little. At the present time I am making quite a number of crowns. I make a gold crown for a bicuspid root and cut out the labial surface and fit in a platinum backing and then bake in Jenkin's body. Thus you can restore the part which shows with porcelain and you can get any color you desire. There are many cases where Jenkin's body is useful. You can lengthen or widen a plate tooth. In large molar or bicuspid cavities I bake in a pin for retention.

Dr. F. E. Roach—Mr. President and Gentlemen of the Massachusetts Dental Society: I am in about the same position as Dr. Gaylord. It seems that there is hardly anything that I can say that would add to the paper, for I have come to take what Dr. LeCron says as law and gospel. Dr. LeCron is not given to saying what he himself does not do. He is a man of few words and is a very efficient workman. Were it not that I have great confidence in Dr. LeCron it would be with some misgivings that I would enter into the discussion of the subject. There was a great hope for it in the minds of the majority a few years ago and there have been several factors that have brought about this slump in the last few years. The use of the silicate cements has revived the discussion of porcelain. It had all the appearance of filling the requirements of porcelain. At first it seemed that it would supplant it. They have their place but they have their limitations. We should thoroughly try out every method that is offered us. I believe in eclecticism.

Then, again, following the silicate cements we had the casting process. This also created a wave of enthusiasm throughout the profession and we each adopted some method. We laid aside porcelain for a time. These different things are proving their merits and demerits. I feel that it is a reflection upon us as a learned profession and as men of skill and appreciative of art that we do not use porcelain more than we do.

I think Dr. LeCron's presentation is sane and logical. We must have our enthusiasts in order to advance. Dr. LeCron has been a close student of porcelain. He has spent the greater part of his life in finding the weaknesses and learning the manipulation. Certainly we cannot afford not to use porcelain in our practice. It is a fundamental principle in our practice to understand

the proper cavity preparation. We have not given this matter the proper consideration. Cement retention alone will not do. A great many men learn this through the experience and disappointment of failure. Our inlays should be made with a definite plan and retention. Our inlays should depend upon two factors for retention. We should have either one or two means of supplementing the principle of adaptation. In the great majority of cavities that will be the principle of frictional resistance so that the cement intervening between the cavity and the inlays would interlock them and resist breaking down the frictional retention. That should be applied to all forms of cavities that are not exposed to occlusal forces. The other class is that requiring a dovetail or equivalent. All contours should have involved in them some form of preparation that would be equivalent to a dovetail. There is so much that could be said that I am inclined to run into details too much. I am very glad to know that Dr. LeCron has taken upon himself the responsibility of stimulating renewed interest in the use of porcelain. I believe he will have a part of the program of the National Dental Association devoted to this subject. In the use of crowns there are none others that will meet the esthetic requirements. My recommendation will be that we shall use it guardedly in our fixed bridgework. In a removable bridge the use of porcelain is ideal. The possibilities of restoration cannot be matched in any other material. If it is removable it simplifies the process of repair. The possibilities and the beauties of it, the sanitary features of it, etc., are unequalled. So that personally I am an enthusiast in porcelain.

Dr. LeCron (in closing)—I do not feel that I can add any remarks. Dr. Roach covered everything necessary. All I wish to say is that as the chairman of the clinic committee of the National Dental Association I sent out invitations to the best men in the United States in the use of porcelain and if any of you come to the Cleveland meeting you will see thirty operators in porcelain, the best the country produces. I thank you for the attention you have given me.

The next order of business was a paper by Dr. H. C. Meriam, of Salem, entitled, "The Society's Obligation to the State, the Community, and Members of the Profession." (To be published later.)

DISCUSSION.

Dr. Werner—We need occasionally to be preached to. Dr. Meriam does not address us often enough. Now, what have I learned from that paper? You must have a dull mind if you do not see the practical suggestion. Our dental society has not done what it should for us. The society should have thirty or forty such papers, rather than four or five. Could we furnish the things that he speaks of? There are too many diversified centres of activity now. There is too much jealousy of concentration of energy and between different schools, etc. There are lots of things in this paper that are full of suggestions. I am sure that Dr. Meriam could give us an equally good paper along technical lines.

Dr. Brackett—I feel honored by this call to speak which comes altogether as a surprise. I have been very much impressed with certain things which have been emphasized and I have had come to my mind from time to time some convictions which are not unworthy of expression. With reference to the compensation of a worthy ambition in a man's life, there are a great many things that are impressive. With reference to the compensation which a man is to receive as a fee for a particular piece of work or advice or professional service or the estimation in which he is held by his fellows, it has seemed to me it was the worthy expression of the man himself. The having of a legitimate ideal not to fail and honestly and conscientiously working towards it is sufficient. His compensation in esteem will surely come. I feel this idea earnestly, that the man who goes about his life work of making his life in the community as worthily serviceable as he can needs not worry at all about his compensation. One of the characteristic things in our profession in recent years is the tendency towards commercialism. It seems to me that there is a considerable percentage of practitioners who come into the work with a fundamental idea, not of rendering the best services to their fellows, but because they feel that they can so manage the conduct of their practices that they shall yield the most money with the least returns. It is deplorable. The faithful practitioner of dentistry is following one of the most laborious occupations that a man can follow. In so far as we can influence the community of dentists, let me

again state in closing what was so elegantly expressed near the closing of Dr. Cigrand's paper, "Let us resolve to strive as far as possible to get away from the small and petty."

Dr. Brigham—I wish to discuss what Dr. Meriam has said in regard to the public clinic. I believe there should be started in this society a clinic for the education of the young dentist, without a fee. They should come four or five at a time to learn how to do the things that no preceptor could teach them. What does the beautiful paper by Dr. LeCron mean to the man who has never practised porcelain at all? Either he or Dr. Roach could have given a clinic that would have taught a man in one-half hour more than he could otherwise learn in years.

The other evening I was called to the city to give a talk before some dentists. One asked me this question: "What do you get for such a piece of work?"

Now if this clinic could be started, and this is a point which I have had in my mind for a long time, and the men would come and see the teachers practising a little while, they being in a moldable condition, would take in things much better than they could in their student days. I often think of the beautiful quotation, "He who does most good for his fellowman, he is the master of masters and has learned their hearts."

Dr. Meriam (closing)—There is much that might be said. I am conscious of the vastly different conditions between the city practitioner with his opportunities for his association with his fellows and the one at a distance. Everywhere the universe is being governed by new laws and new conditions. In regard to Dr. Brigham's remarks, I will state that when I was giving clinics I used to consider myself lucky if after I got home I did not find some letter asking me the price of the gutta percha I was using.

President Lindstrom—One of the Western men who is visiting us told me he was dumfounded not to find more young men at the convention. Said he, "In the West they are found in great numbers at every meeting."

Dr. Rodgers—I would like to ask Dr. Meriam a question: He said these tendencies were in the human mind. Now what advantage is it to try to change anything ingrained in human nature? Rather take and direct these innate tendencies in a chan-

nel that is good. I find that the schools are doing good work and helping to serve the young man nobly. Others have complained that the schools have not taught properly.

Dr. Meriam—A wise man said, "Walk in the spirit lest ye fulfill the lust of the flesh." The spirit of ethical teaching that may be held up to us will do away with the tendency that laws teach. We have just as much need to give these ideas to the students as to give useful ideas. In my own day the medical school was begun with an address of welcome. Some of those old addresses showed a fine exhibition of what the principles of men were in those days.

The subject was then passed.

Dr. Brigham—It seems to me that the executive committee could find some place to meet under one roof for both the literary portion of the program and the clinics. It would be better than this year's arrangement where so much time and effort is consumed in traveling about.

Dr. Smith—I would state in answer to the gentleman's remarks that as president-elect I have already considered this matter. It is our purpose to arrange to have next year's meetings all under one roof.

The meeting then adjourned until the evening session.

The evening session was called to order at 7:30 p. m., with President Lindstrom in the chair.

The first order of business was a paper by Wm. S. Gottheil, M.D., New York City. Subject: "The Mouth in Relation to Skin and Venereal Diseases." A stereopticon paper.

(Published on page 346 of this issue of THE JOURNAL.)

DISCUSSION.

Dr. Bangs—I never undertake a case without considering the handbook of Dr. Gottheil as an authority. Quite a number of the cases shown have been familiar to me as I have seen the cases in New York. This morning Dr. Smith called me up and stated that he would like to call upon me for some discussion of Dr. Gottheil's paper. It was so late that I have had little opportunity to add anything of importance to the discussion of

the paper which has just been read here. I am very glad that you take this branch of study in your society, that of a better education in syphilis. If we consult the medical authorities of fifteen years ago we will find that syphilis was then classed as a general disease. That view has been gradually eliminated until now it is classed as an infectious disease of slow development and conveyed by infection by any manner which will deposit virus on the body. When regarded as a general disease it has been a subject that could not be well discussed before the general public, but when we consider the unmerited cases of syphilis that form twenty per cent. of the total according to Dr. Gottheil, we can say that there is a great field that is open for discussion. The characteristic signs of syphilitic chancre show only at the point of inoculation. So there is shown to be a great field where infection could not have occurred along the line of venereal infection. Many of those occur in the region of the mouth. I was unable to locate some compilations I have made on the subject so I will quote to you some calculations of mine regarding this: In 642 cases he finds that the chancre appears in 484 cases on some part of the head, 328 cases around the lips, 9 on the gums, 4 on the palate, 1 inside the cheek, 24 on the chin, 9 outside the cheek, 5 on the nose, 2 on the scalp. I will simply allude to a very few as illustrative of a large class of infection brought on in various innocent ways: One case shows an infection brought on in a street brawl. A Portland physician showed another case on the tonsil. This fellow had a messmate who had syphilis. He was in the habit of taking his chewing tobacco and biting off a piece. In speaking of the matter of finishing cigars, I recall a case of a physician at a Berkshire society who gave an account of a limited epidemic among men who were in the habit of going to a certain Italian cigar dealer who made a certain special brand of cigars. In the old process the wrapper was rolled by the tongue and then the tip was bitten off. This dealer had syphilis and it seemed likely that he was the cause of the entire epidemic. It was formerly the habit of Cuban cigar makers to roll it on the thigh. Now reforms are being carried out in accordance with the general health movement so that abuses of that kind are being eliminated. One of my neighbors reported a case where a young lady had a chancre on the lip. She had the

careless habit of holding a coin between her lips when making change. One of the latest cases in my clinic was a man who had a chancre on his lip. This man held his pipe on the right-hand side and said that on shipboard a man picked up anybody's pipe and smoked it. A similar practise of passing around a flask is responsible for cases. One of my neighbors reported a case of syphilitic infection of the lip where a minister had infection of the lip. Now there was a man in his congregation who had active syphilis and it seemed likely that the common communion cup was at fault. A year ago there was a case of a girl who had a chancre of the lower lip. The probable cause was a common drinking cup that was largely used. In spreading the infection of syphilis the kiss is an infector. If we all realized the enormity of the risk we should insist upon abolishing the common drinking cup everywhere. It is the duty of us who are informed to do our part in educating the public in regard to the dangers of syphilis. The education of the people is what accomplishes prophylaxis so that both the sick and the well should know what should be done and what should be left undone to protect others from the danger. In this country the lowest estimate of cases of syphilis was from two and a half to three million cases. Some go as high as seven or seven and a half million. The best conclusion is that we have five million cases of syphilis in this country alone. From one to one and a half million of these cases are innocent. In closing I wish to urge upon you not to ignore in your practice the existence of this disease, which is one of the great menaces of society.

Dr. Gottheil (closing)—I want to congratulate Dr. Bangs on the advanced stand he has taken. I once treated a family of eleven who had it. The daughter of sixteen got it in the usual way. In various innocent ways the other members of the family caught it from her one by one. The last to get it was the father. Thus in these cases only one was not syphilis of the innocent.

The next order of business was a paper by Dr. Wilfred R. Wilson, of Boston. Subject: "Apropos 'Tooth Tinkers.'" (Published in the June JOURNAL.)

Owing to the lateness of the hour there was no discussion of the paper. On motion of Secretary Rodgers, the Society gave a rising vote of thanks to Drs. Gottheil, Bush and Wilson.

Adjourned sine die.

FIRST DISTRICT DENTAL SOCIETY OF THE STATE OF NEW YORK.

October 2nd, 1911.

A regular meeting of the First District Dental Society of the State of New York was held at the Academy of Medicine, 17 West Forty-third street, New York, on Monday evening, October 2nd, 1911.

The President, Dr. W. W. Walker, occupied the chair, and called the meeting to order.

The minutes of the last regular meeting, also of the last special meeting, were read by the Secretary, and approved.

President Walker—The report of the supervisor of the different sections should have been read by Dr. Perry, but Dr. Perry has only been acting in that capacity for a short time, and as I perhaps am more familiar with it, I will take the liberty of reading it.

I was talking with our friend Dr. Ash the other day about the technique work of Dr. Ottolengui. He thought he knew all about impressions, and had met with success, but after seeing Dr. Ottolengui's technique, he said he knew nothing whatever of it. Dr. Ottolengui will be with us this winter.

Dr. Disbrow, of the Free German Dispensary, will show cases before and after operation.

Dr. V. H. Jackson and his assistants will demonstrate the Jackson method.

Dr. Harold Vaughan will lecture on oral surgery.

Dr. Tracy is chairman of the section in crown and bridge-work, porcelain and gold inlays.

Drs. Rhein and Hutchinson will be with the section on pyorrhea. We expect that to be one of our very important sections.

All recent graduates of dental colleges, who have located in New York, can become members of this society by reporting to the Executive Committee. They can have their membership free for one year.

The committee that was appointed on the revision of the Constitution and By-Laws have met during the summer, but are not all here to-night; and are going to report in full sometime during this week, so that in the near future there will

be a special meeting of this society, at which time we can adopt in full the new Constitution and By-Laws.

In order to facilitate the work of our meetings, the Executive Committee has thought it wise that we have a Reception Committee appointed for each meeting, whereby our visiting friends from out of town and some of the new members may be made acquainted with each other, and feel perfectly at home in this new Dental Society of ours.

The Reception Committee for the November meeting are Drs. Rhein, Linton, Solow, Dunning, Fisher and Heckard. They will please be on time, and see that we can start in with our meeting promptly at eight o'clock. We are twenty minutes late to-night.

As this is the first meeting of the allied societies, the New York Odontological Society, the New York Institute of Stomatology, and the New York Institute of Dental Technique, it calls for something more than just the passing of the word. I have therefore asked Dr. Perry to say a few words on the alliance of these societies with the First District Dental Society.

Dr. S. G. Perry—At this first meeting of the season, as well as the first meeting of the Allied Societies, it may not be out of place briefly to call attention to the earlier conditions of our profession, as well as to add some thoughts in reference to its present status.

In a paper entitled "The Evolution of Dentistry," which I read this last July before the National Dental Association at its meeting held in Cleveland, I endeavored to show that at the organization of the first dental college in 1839 the conditions among dentists were such that it could not have been expected that any medical college then existing could have recognized dentistry as a profession and as a branch of medicine.

There was as yet no dental profession to recognize. Our affairs were in such an undeveloped and chaotic state that, in my judgment, it would have been unfortunate if we had been recognized by medical men, and given a department in any medical college then existing.

We had yet to make a place for ourselves in the scientific world, and the men who organized the first dental college were compelled to make it an independent organization.

Then began the process of upbuilding our profession, and those earnest men builded better than they knew. From that day to this the development of dentistry has been along natural lines.

At no moment of its existence from that date has it been in a false position. It has been free to develop in accordance with its needs, and with no restraint from the conventional methods of medical teaching.

Like 'Topsy it "grewed," glad to be alive, and happy in the knowledge of being useful in the world, and not caring if it received recognition or not. During all this period, almost unconsciously it has been fitting itself to take a commanding position as an important specialty in the healing art.

In charge of the oral cavity—the great gateway to the human body—it has drawn upon so many branches of knowledge, and become proficient in so many departments of science that the sum total of its attainments entitles it to stand on a par with medicine, and therefore to deserve recognition from that ancient profession, as well as from the world at large.

The most accomplished dentist of the world to-day may not understand gynecology and therefore may not be entitled to the degree of M. D. any more than would the most eminent physician understand dentistry and be entitled to the degree of D. D. S.; but who will now claim that the degree of D. D. S. as issued for instance by the University of Pennsylvania does not represent as much real knowledge as the degree of M. D. issued by the most important college in existence!

If this is a fact—and you know it is—then the degree of D. D. S. stands for as much knowledge as the degree of M. D., and the recognition of dentistry as a branch of medicine must follow inevitably.

If the degree of D. D. S. issued by other dental colleges of the land is not up to this standard it will be in time. All this has been accomplished since 1839, and it has been done by men who have been so absorbed and infatuated by their work that they have not sought or cared for recognition from the medical profession.

They have sought and cared for recognition from the lay world, and it has been awarded them in abundant measure.

To-day dentistry is one of the most important branches of the healing art, and is now being recognized as such by the mother profession of medicine whether we care for that recognition or not.

This brings me to the very gist of the matter I want to speak of. Being recognized as having charge of the oral cavity we are placed in a most responsible position. Since the health of the human body depends in great measure upon the condition of that cavity, it naturally follows that upon our shoulders must rest, in great measure, the responsibility for the health of the whole community!

Our work now is not confined to the filling of cavities in the teeth. We are expected to care for the sanitation of the mouth, to understand bacteriology, to intelligently treat diseased tissues, and, above all, to understand and practice prophylaxis. We cannot escape this if we would, and we have no desire to escape it if we could. The history of the onward march of our profession proves this.

If we were not born great, we are now willing and able to have this greatness thrust upon us. From this time forth we may as well assume that our profession is a specialty of medicine, and one susceptible of division into a greater number of sub-specialties than any other branch of medicine.

The time has gone by when small groups of men organized in societies can represent adequately our profession. The merging of our leading societies into one comprehensive organization that can more completely represent its best interests is only a logical outcome of the times.

Starting at this opening of the winter season, this society, combining the interests of the Allied Societies, is in a position to be of immense service to our profession. Its democratic attitude welcoming into its fold all ethical practitioners of dentistry, its recognition of the need of sub-division into sections by the means of which all its specialties can be more fully developed, and above all its desire to create confidence and cordial relations between its members gives it an advantage never before possessed by any society.

It should be our duty then, as it should be our pleasure, to make the coming winter memorable in the history of dentistry.

Our President has been quick to perceive the tendencies of the times, and with far-seeing vision he has done a tremendous amount of hard work in affecting this reorganization, and the very least we can do is to stand by him in this most important work.

It is a great day for dentistry when men will come together dropping all differences and be ready to work for the common good of our profession. There have been times in the past when I have grieved over the condition of our profession in this city, but, thank God, I have lived to see the day when all that I can wish for seems likely to be realized. And nothing pleases me more than to see that we are beginning to realize that the heart quality has a legitimate place in professional life.

This life of ours is a hollow sham if we have not ideals, and I think the finest ideals within human reach are the desire to work for some good purpose and to love each other while doing that work.

President Walker—For the information of the members of the Society, I will say that we have fifty-one new applications for membership, and under the new By-Laws we will soon have at least one thousand members in this Society.

Dr. W. V.-B. Ames, of Chicago, then read the paper of the evening, entitled "Oxyphosphate Cements." (See p. 356).

DISCUSSION.

Dr. Joseph Head, of Philadelphia—I wish to state that I consider Dr. Ames' paper one of the most valuable on this subject that has been presented for years. He has with great frankness mentioned names, but I think we all appreciate the scientific spirit, and the knowledge and advantage that we obtain from the use of these names; and we could not have understood the points he wished to make unless the names had been mentioned. It is, of course, ordinarily wise not to mention names, but in a case like this, where human suffering and pain are standing on one side, and perhaps commercial advantage and a loss of dental supplies on the other, much as we regret any misfortune that may happen to anybody, we cannot help feeling that the welfare of the patient should be conserved first and at all costs. The patient should be given the best possible supplies obtainable at the time when his filling is inserted.

Concerning the death of the pulp under a cement filling, the problem is not so simple as it would seem. The great question has been up to this time—is the pulp destroyed by arsenic, or is it destroyed by phosphoric acid? I think any of us who has a slight knowledge of chemistry will appreciate that arsenic need not enter into the question, because the very great heat that the oxide of zinc has to undergo to the very end, and the natural evaporation of the arsenic would be so thorough that any arsenic that could possibly be left would be so closely associated with the zinc that it would hardly be in a sufficiently free state to affect anything; and so I think that we can promptly give up the idea of arsenic in any way affecting a tooth pulp.

Concerning the phosphoric acid, I have often wondered whether phosphoric acid has destroyed a pulp—whether there have been tests made as to whether pure phosphoric acid will destroy the pulp. I doubt if it is nearly so guilty as it is considered to be.

There is another point—that we are very apt to put cement into a cavity that is near the pulp, and the decay has probably in many instances reached the pulp; and who shall say how much that pulp has already been affected, and who shall say when a filling has been inserted, whether that pulp dies from the infection which it has already received, or whether it dies from the action of the phosphoric acid?

In my experience I have seen cases where an abscess had developed at the tip of a tooth where the pulp was alive, in single-rooted teeth, and the abscess only got well when the pulp was destroyed, showing that there was infection within that living pulp sufficient to make an abscess at the tip of the root. Under these conditions who shall say whether the pulp dies from infection or from phosphoric acid?

I want to ask Dr. Ames if he thinks there is any cement that has been in the mouth for a year or two, when cut with a bur, or removed to crown, that will not give a disagreeable odor. I know there are anyline tests and other tests, but it a very different thing as to whether water is going to enter a cement, or the fluids of the mouth.

Once or twice in my practice I actually think I must have punctured the side of a dental canal. I know nobody else has

done it, but I did do it, and I found this out when I had cemented the crown. In about three to six months it would wobble and get loose, and the cement at the neck would be good, but the cement at the tip would be gone and destroyed. A living serum evidently had some power of disintegration that would make that good cement dissolve inside of three to six months.

Expansion in cements, in ordinary inlays, unless it is too great, will only tend to make a tighter fit. Would Dr. Ames think that expansion in itself, to a mild degree, is harmful, and does the slight per cent. of expansion effect a material change in so small a body as a layer of cement?

Concerning adhesion, some years ago I made a number of experiments with cements, and I felt that the Harvard cement on account of this very expansion had a greater adhesion than the Ames crown cement, which had very little. I was wondering if Dr. Ames would explain how that could be remedied, and I think he very readily can.

As he has spoken of the Harvard cement, I have used that a great deal, and far from having to keep it dry for half an hour I have found two ways of protecting, which make such a long delay unnecessary. I have found that paraffin protection after the crown is set will to all appearances give good results. In approximal inlay fillings I have filled the tooth until the approximal surface was full of the cement, leaving the excess overlapping the edges, and the next time I have found that the cement seems perfectly good, and have found this also from practical experiments out of the mouth. It seemed to interfere neither with the strength nor adhesion of the cement.

The one thing we should remember about a cement filling or cement inlay is that it is primarily a therapeutic filling. We in dentistry are apt to consider whether the filling is going to last a long time, irrespective of whether it primarily is going to preserve the teeth. A cemented filling will always be a good filling as long as the cement lasts, if it only lasts a week; but the average hammered gold filling, hammered as it is, is very apt to have fissures that lead from the margin down to the bottom, and decay will almost immediately start, in a great many, if not in the majority of such cases. I know there are a great many who will say, "It may be so of yours, but not of mine." I am only speak-

ing of what I have observed in my own practice, and perhaps in some others, but I think we as doctors should first and foremost see that the students are trained to put in therapeutic fillings, and then let them make them last as long as they can.

I wish to say that the remarks made by Dr. Ames wherein we are instructed how to use the various powders and various liquids of the new manufactures is one of the most valuable suggestions I have heard, and denotes the strong scientific conscience of Dr. Ames, showing that he is primarily interested in the welfare of the profession, in the good of the patients, and is not approaching this subject from the mere standpoint of the manufacturer.

Dr. W. B. Dunning—We are much indebted to Dr. Ames for his paper, which combines in an unusual degree the consideration of highly technical problems together with matters of practical import, concerning the oxyphosphate cements. It is scarcely necessary to say that only a practical and successful manufacturer of cements, such as we know Dr. Ames to be, can discuss adequately both aspects of his topic. The dental practitioner in consuming his products acquires an expert but empirical knowledge of their working properties, and in most cases he is restrained, by the limitations imposed by daily obligations to his patients, from much original experimentation.

It would be difficult to overestimate the importance of the advent of the oxyphosphates in dental practice. To forego the use of metal and porcelain inlays, of crowns and of all fixed bridge work, not to mention the simple use of cement as a filling and hermetic sealing material, would mean the abandonment of modern dental practice. Our progress during the past twenty years in this special department of cement manufacture has been wonderful, and from all indications the ratio of progress is increasing.

The oxyphosphate of copper is a most valuable filling material, and to Dr. Ames, the originator of the preparation, we all owe a debt of gratitude. In the treatment of deep-seated caries in children's teeth, it is a great boon, because of the ease with which it is inserted, its resistance to wear and to the action of oral fluids, and, perhaps most important of all, its definitely anti-septic property. Where thorough cavity preparation is impracticable, this material does much towards retarding the carious

process. This substance is easily tolerated by the gum tissue and is very useful in pyorrhea cases where it is desirable to fill very difficult cavities in roots, or to close up "catch-places" between bifurcated roots, which have been left exposed by gum recession, and to prevent the lodgment of decomposing food particles. This operation need not interfere with future instrumentation and thorough prophylaxis. The cement is so adhesive that it will cling and be serviceable where no other substance I know of would remain. Dr. Ames has recently perfected the ingredients of this cement, whereby the setting is made prompt and definite, and the resultant mass very hard.

The hydraulic quality recently developed in crown and bridge and inlay oxyphosphates is most advantageous. Of course, it is understood that such a cement must be kept from moisture during the lining of the cavity and the pressing home of the inlay or appliance; but it is a relief to one's mind to feel that, after that important step has been taken, he may disregard the rising tide of saliva, which will soon submerge his work.

I should like to ask Dr. Ames if he considers the relatively high thermal conductivity of the silicate cements, due probably to density, as being a more potent factor in pulp injuries than any chemical properties possessed by those substances? I do not recall a case of trouble where a deep cavity has been protected at its pulpal wall by the ordinary oxyphosphate, but the full explanation of that fact is not quite clear to me. I should also like to ask if, in his judgment, the acceleration of the setting process by the application of moderate heat tends to produce a faulty or abnormal crystalization or undue expansion?

Dr. Ames's suggestion that we disregard the caution of manufacturers to use only the liquid supplied for each cement—and boldly to grasp the advantages to be gained by blending various powders and liquids—is a strong appeal to the "man of independent mind." It is exactly what we would like to do—were it not for lurking fear that some chemical blunder will creep in, of which the operator may be wholly unaware at the time of mixing the cement, and which may not appear until after some lapse of time. We cannot all be manufacturers of cement, but the majority of our profession have sufficient chemical knowledge to appreciate roughly the problems involved in the chemistry of

cements, *plus* the far more intricate and varied chemistry of the oral fluids, in which the cement is to be immersed. In our dilemma we regret, but are forced to acknowledge the limitations of unexpert knowledge, and, in so intricate a matter, are usually inclined to abide by the word of the manufacturer, rather than "fly to evils we know not of." This attitude is unscientific but human, and frequently wise, in a practical way. It should not, however, deter us from making such independent tests and check-tests as may be within our reach, and which may tend to make each man a master of the material he is using. Dr. Ames gives us some concrete suggestions in the blending of cements, which will be very useful in this connection.

Dr. F. T. Van Woert—The subject of cements, which has been so ably presented by the essayist, is of vital importance to us all, inasmuch as the best filling known for the preservation of teeth is the cemented one, perfected and given us by Drs. Jenkins and Taggart, and which are dependent upon such men as Dr. Ames for their success. Without a partially successful cement the two first-named gentlemen would never have achieved the marvelous results which have made them so famous. On the other hand, careless and impracticable application of the methods devised by Drs. Jenkins and Taggart will cast a shadow upon the great work of such men as Dr. Ames and his predecessors and the virtues of their likewise wonderful achievements.

I have felt, for a number of years, that an exact method for the mixing of cements must come before we could hope to get the best results from any of those at our disposal. I remember vividly some of my early experiences when I was not in a position to shoulder the failures, and of the many unhappy hours following; and could only console myself with the thought that few persons beside the manufacturer knew much more than I did about their use. The subject was of so extensive a nature that the busy practitioner could not afford the time, even if he were competent, for a scientific investigation. The manufacturers gave little more than a simple formula for the mixing.

We have, in the paper of the evening, together with previous writings of the author, data upon which to base a scientific manipulation and use of all cements manufactured by him and practically all of those upon the market to-day. His explanation

as to the cause of expansion and contraction is in itself worth an entire evening. This is one of the things which has caused me a great deal of annoyance, and, I presume, accounts for some of my failures. There are, however, a few difficulties which we all, by clinical experience, have learned to avoid; such as an attempt to make a mix upon a slab still warm from recent washing; too rapid addition of the powder; imperfect spatulation (either too much or too little), or in not having the powder and liquid in the right proportion. This last is more difficult of correction than any of the other blunders, largely because of varying symptoms, due in many cases to climatic conditions. In some of the older cements I have been obliged to chill the glass slab upon ice, during the months of July and August, before anything like a satisfactory result could be obtained. Fortunately, this is not the case with the more modern products. Each cement, whether old or new, seem to win certain operators to their use regardless of how much better another may be. In other words, an operator often becomes attached to an inferior article simply because he has mastered the manipulation, or thinks he has done so.

I have had an exceptional chance for comparing notes on the cement question during the last two years and find a great diversity of opinion upon the subject. Yet almost all agree that those manufactured by the essayist are the most flexible of any at our command. Personally I am and have been using three different makes for the past few years—one for a certain class of work, one for another and the third for still another (for all standard operations)—interposing an occasional odd one, such as silicates. The last, by the way, has not proven very satisfactory, except in temporary operations for children. Perhaps this is due to some defect in my manipulation, but upon close observation I am led to believe that there are many other operators suffering from a like deficiency. The silicate cements are far from perfect, and I fear those who have abandoned porcelain, for their use, are digging their own graves. I am inclined to believe, however, from some things that I have heard recently, that there is a prospect of perfecting these cements.

I am very much indebted to Dr. Ames for his very valuable contribution, and thank him for his generosity in giving the secrets of the manufacture of cements.

Dr. Ottolengui—Dr. Ames, in the early portion of the paper, speaks of the very prevalent dogma, in the early history of the profession, that the phosphate cement fillings were liable to fail at the cervical margin; and he advances the very ingenious theory that these defects were not from solution or breaking down of the cement, but because of a lack of crystallization during the drying, drawing the cement away from the cervical margins. That is a new idea to me, but I have no doubt that has been the explanation of some of the failures of cement at the cervical margin. Yet I would like to remind Dr. Ames and others that exactly the same criticism was made about gold. The cervical margin was the place where all fillings failed, and I believe that his last premise is the correct one—that it is not the fault of the material, but of the operator.

I believe the fact that we do not have these failings at the cervical margin at the present time is wholly due to the work of Dr. Black, and the wider cutting that is advocated by his disciples. This has come into more general practice since the advent of the cemented inlay.

I think it is abundantly evident that we require totally different qualities in an inlay cement from those which we need in a filling. If we are making a filling we naturally incorporate a great quantity of the powder in the liquid, getting a fairly stiff mass, a mass so stiff that it could not be used for cementing a crown, or more especially a porcelain inlay, where we desire an invisible joint.

For the porcelain inlay we naturally require a cementing agent that will set when it is as nearly fluid is possible. Thus the demands for a cement and a filling material are so different that it seems entirely irrational to supply both needs out of one bottle. I may be mistaken, but I believe Dr. Ames is the only one who has furnished us with an oxyphosphate for fillings, and a cement for crown and bridge work, and for the setting of inlays, and especially that can be used in positions that cannot be kept dry. I express it that way because I entirely agree with Dr. Ames that he has been misunderstood, although he has frequently explained his position heretofore; that is to say that his so-called hydraulic cements, or cements that set under moisture, do not require a wet surface.

Dr. Ames' paper before the American Society of Orthodontists, some years ago, explained this pretty thoroughly, and I would like to testify for the Ames Crown and Bridge cement, with the "C" liquid, that, at least in my hands, it affords absolute safety for the tooth which is banded.

That brings up a clinical fact, which seems curious, and yet possibly explainable; perhaps Dr. Ames will explain it. That is that the cement will adhere to the tooth surface more than it will to the band, especially as we can get our band absolutely dry before we put it in, and it is very difficult, especially in the lower jaw, to dry the teeth as thoroughly as the bands are dried.

Dr. Ames speaks here of the Harvard cement, and of the slow setting, and also of the fact that it expands slightly. That I think accounts for the fact that those who have used it for inlay purposes have felt the necessity of hiring a special assistant to hold the inlay in place for an hour or so while the cement was setting, so that it would not bulge out of the cavity. It also accounts for the fact that the inlays which looked well at first have come back after a few months with very wide cement margin showing.

There is a distinct advantage in a quick-setting cement, and I have never felt inclined to use the slow-setting Harvard because of that experience, that is, the bad joints, or else the necessity of keeping the patient so long. I would like to know whether this new quick-setting cement has any of the good qualities of the other without the bad.

Now, this is a point I said I was going to speak about especially. Dr. Ames has cut out about four pages of this paper that I think should be put right back, and I think he has cut it out because of some modesty, or because of the fact that he was afraid that it might seem too much talk of his own material, but the Ames materials are reliable, and we are going to use them, and who could tell us better how to use them than Dr. Ames? He had a deal of very interesting and valuable information about the use of his cements, and the results obtained by the use of them, mixed with his various liquids.

Now, I believe, gentlemen, all of you would be just as interested in this paper in its original form as I was, and I do hope that when it is published a great deal of this matter which has been cut out will be put back.*

*Dr. Ames' paper has been published in full.—Ed.

I am very glad to have the copy I have and was so much interested in this particular part that I turned it over to my assistant to-day with the request that she should especially study the various methods of mixing these Ames cements for these definite purposes.

There is one other question. In discussing silicate cements he speaks of the white being of such good quality, and I have wondered whether it is impossible to get a perfectly white oxyphosphate. There are cases where we need a very white lining, or a very white cement, and where I have absolutely required it I have been obliged to resort to the oxychloride to get it.

There is a question which Dr. Head has already answered in a measure, about the death of pulps. Assuming that silicate cement may have such an effect the question arises whether the frequent death of pulps has been caused by cements, or whether by proper operative procedure such deaths can be absolutely prevented. It is very easy to prevent the pulp from dying; all we need do is to remove the pulp before inserting the cement.

Dr. N. T. Shields—I was very much pleased to hear Dr. Ames refer to the use of the light Ascher cement. There is only one form in my hands that has not changed color, that is No. 1, and I am glad to have my experience verified by a man like Dr. Ames.

In the use of any silicate cements, I invariably line the cavity with oxyphosphate first. In an anterior place the silicate cements are most advantageous, but I never trust to them alone.

Dr. S. G. Perry—Perhaps you may be interested in what I saw in London this summer in the office of Dr. Williams in the use of De Trey's synthetic cement.

Dr. Williams showed Dr. Darby and myself a case of a first bicuspid on the buccal surface built up to the perfect form of the tooth. It was more than a year old. I assure you it had the appearance so perfectly of a tooth that it had to be examined very carefully to see it was not a tooth. The joining was very perfect. The glaze was very new and very polished.

This was in the mouth of some young gentleman who was connected with Dr. Williams' office, and Dr. Williams told me that it was not at all an unusual filling—that he had made and

seen others from the hands of other persons that were equally good.

Dr. Darby and I were interested enough to go to Dr. De Trey's place in London, where we found his representative. We saw there some of this new cement, and we learned there that Caulk & Co., here in this country, had the control of it, and had expended a great deal of money in making a plant so that it can be supplied to us here without duty.

Dr. Ames states that the silicate cements thus far have an advantage over any of the oxyphosphates. You could not see the filling in the mouth of that young boy without feeling that a distinct gain has been made in that direction.

The time is evidently near at hand when we shall have more satisfaction from the silicate cement than we have had from the oxyphosphates; but it does not follow that we shall have to give up the latter, because they can be used for linings, for setting inlays, bridges, crowns, for which silicate cements cannot be as well used.

Those who have been discouraged with Ascher's cement must take hold again with faith, because I surely believe there is yet something in store for us in the way of silicate cements, and if Dr. Ames will carry still further his investigations, I believe he will yet give us something far better than anything he has ever done.

In putting in these fillings I have used little glass points, such as I used for rubbing in gold after Dr. Shumway's method. I have always used them against brittle walls, and these little burnisher points are very serviceable in tucking this material in. As soon as it is in the cavity I do not touch it until it has hardened, because according to their instructions it should not be moved while in process of hardening.

Get it in quickly and bind it there, wrapping around the teeth a thin strip of celluloid, touched on the surface with cocoa butter, and hold it still until it hardens. Then cover with the wax that goes with it. Of course, only time will tell how it will last.

Dr. Ames (in closing)—I want to say that there was no element of modesty which kept me from giving to the Society all the matter I first prepared. It was simply that in attempts

to read it as carefully as it ought to be, and against time, I found it was out of the question to expect an audience to be patient for the hour and some which it would have taken; so I did the best I could to make a connected story of it, leaving out some matter which I myself believed valuable. For that reason I made the suggestion that that matter would make good footnotes in the publication.

Dr. Head commented on the possibility, or my criticism of the possibility, of getting variously colored powders from heat alone. He cited various colors from plumbago crucibles (giving off carbon) and clay crucibles, in some of which there is plenty of iron. That is simple.

Now, my statement was that heat without pigmenting materials would not give the various colors ranging from cream white to dark brown and grays. The plumbago crucibles furnishing carbon, and the clay crucible with a smear of iron will give pigments, of course. He mentioned also that the grinding of cement powder would change the color, it becoming more yellow. If you will put that same powder in a proper crucible and heat it to a mild degree it will go back to the original color after cooling.

Why that different physical condition gives that change of color is something I cannot explain, but it is a fact.

It has been recommended at times that certain coarse powders be ground in a mortar to fit them for inlay setting. Any one doing that will change the complexion of that powder, and to secure the original color it will be necessary to give it a mild annealing heat.

The matter of solubility in blood serum is something I cannot gainsay, and yet it does not seem to me such a serious matter as Dr. Head makes it. Once in my experience of twenty-four years' practice did I see the root of a tooth literally cut off, a bridge being found loose at one end, which seemed peculiar. On removal, it was found that the cemented attachment had not changed, but the root of the tooth had been severed just beyond that point. It had that peculiar appearance of resorption which we often see from recognized causes. Possibly the blood serum caused some such activity.

Another question brought up by Dr. Head I can best answer by reading a paragraph from the paper which was not read by

me or by Dr. Ottolengui. In a part not read I enlarged upon the peculiarities of Ames "D" liquid, which I say is similar to the Harvard, Eisfeilder and Justi liquids.

"The Ames powders as used with the Ames 'D' liquid give masses showing a very slight porosity, the merest perceptible expansion as measured by the micrometer and provide a grade of adhesiveness sufficiently above the quicker setting combinations to warrant the expenditure of the extra time its use requires in the attachment of some precarious appliances.

The special advantage accruing from the use of such a liquid is from expansion being practically nil, which suggests its use in attaching porcelain inlays, with which less mechanical retention is offered than in cases of metallic inlays, crowns and orthodonta appliances. With any of the latter a slight expansion decidedly enhances the result, while practically all porcelain restorations built to the most approved cavity preparations, need a cement which will set without shrinkage *as a matter of course*, and one with which the expansion is practically nil."

I recognize that a slight expansion such as is provided by the Harvard cement will so hold an orthodontia appliance, or crown, or anything in which there is a sufficient mechanical retention, but there are cases of porcelain restorations in which I claim that expansion is a bad thing. Harvard liquid used with another powder than Harvard may show practically no expansion.

Dr. Head mentions tests, made, I believe, by cementing a conical block in a receptacle.

Dr. Head—Some of your tests were set in a conical box in which there were holes for retention.

Dr. Ames—I say in my paper that the adhesion of Harvard cement is satisfactory, as evidenced by tests and the testimony of users, and that the Ames "D" is similar to Harvard. It happens that within a year or two Dr. McCauley, a member of the Texas Board of Examiners, made tests with different cements, and the results were not entirely in accord with Dr. Head's. I might say that in our laboratory much testing is done, but I am not here to tell about that.

Dr. Head commented in general on the safety of cemented operations. I said in the paper that I know of inlays that have been in position for twenty years, and are in satisfactory condi-

tion. I have seen and I could easily show cases where, after many years, natural crowns have been cut off because of the desire to construct a bridge, where inlays have been in place for a long period, and where the joints of the inlay were decidedly imperfect around the positions where you would naturally expect solution, if there was to be solution, and where the person who argues against these operations will always say they can not be dependable, and the cement is always found doing its part. It has been shown so often that from an open joint the cement will not disappear to any great degree, even from direct attrition, and decay is not as apt to occur from an imperfect cemented joint as if that had been an imperfect margin about a gold or amalgam filling.

Dr. Dunning brings up the question of danger from conductivity of silicious cement. This is undoubtedly a factor. These are decidedly better conductors than oxyphosphate of zinc, but I do not believe that this is the greatest factor in the destruction of pulps.

Dr. Kulka cites the experiments of two individuals; one found he could seal phosphoric acid in a cavity without destruction of pulps, and another found he could easily destroy pulps. I have not been in a position recently to carry on such tests, but I am morally certain from what I saw in my days of practice that phosphoric acid was an irritant when the tooth pulp was too closely encroached upon, and a cement without real defined setting qualities was used.

The question of damage to a silicious cement by the application of heat I think we can disregard. Any degree of heat which the patient will tolerate is going to be beneficial, hasten setting of cement, and give a better crystallization and integrity, and can not be a disadvantage. I believe that any silicious cement filling should be inserted with the expectation of trimming the mass down to a proper contour after the cement has hardened, instead of expecting or attempting to burnish that cement to a definite mass and have the hardened mass represent the desired contour. Any blemish of the surface by the heat causing with some cements the passage of the liquid to the inner portions of the mass, leaving some of the extreme edges or surfaces imperfect is no disadvantage, because all these surfaces and edges are to be removed in the finishing.

I do not know whether in the operations Dr. Perry speaks of they attempt to finish the filling by burnishing or trimming.

Dr. Perry—They do it exactly as you have stated, Doctor. No attempt to trim it down or burnish it for the time being, until it gets thoroughly hard.

Dr. Ames—I believe that this is the method which will be adopted in the using of all silicious cements, because there is a tendency to imperfections of the surface in the setting process, and if the intention is to trim away a considerable portion you will get down in all cases to a cement of proper texture.

Dr. Dunning questions whether there is any danger of trouble in the course of time from making blends which do not appear at the time. I will say that any combination which seems to act properly and give you the proper result at the time of dismissal will not degenerate later because of an experimental blend.

Dr. Ottolengui brought up the question of whether cement adhesion to tooth surface was more satisfactory than to the surface of metal bands, etc. I think the calcareous nature of the tooth surface and tubuli of the teeth are more conducive to the attachment of cement than the smooth surface of metal. The porcelain inlays, properly etched, very satisfactorily attach, and these inlays do not give as ideal a surface as a tooth which is calcareous.

Dr. Rhein—In that respect, do you advise moistening both the tooth surface and the inlay?

Dr. Ames—I would advise that, always emphasizing that the merest trace is sufficient. The cement will flow more readily to tooth when slightly moistened. There are inequalities, and the cement will better flow to those inequalities if slightly moistened than if it is perfectly dry. Moisten with cement liquid, because in that you have something which will be taken into the cement mass in the basic phosphate forming process.

The question was brought up as to why we can not mix cements as definitely as you mix investment materials. Now, the setting of cement is a rather vigorous chemical action, and the setting of an investment is a matter of hydration. Hydration is a less energetic process than the other chemical action and is less affected by ulterior conditions. If you would adopt Dr. Ottolengui's suggestion of a square bottle with water of a definite

temperature, you could then come nearer using definite proportions of powder and liquid, than if you use a slab of any old temperature it happens to be, and better than if you use a bottle with ice-water and have condensation of moisture to defeat your purpose.

The question was brought up by Dr. Ottolengui as to why we can not have a snow-white oxide of zinc powder. The whitest heavy oxide of zinc is a cream white, and not a snow-white. The ordinary zinc white, such as was photographed for one of the pictures sent about, is a snow-white material, but when you come to make the crystalline oxide of zinc it always takes on from some physical conditions a cream-white color. Any powder whiter than the whitest which can be thus made, must be produced by incorporating some foreign white material, and if calcium oxide, which is the only snow-white material which would not retard the setting, is used, the setting is too much accelerated. I could mention one cement in which an extra white powder is produced with which very quick setting will be obtained. A mix of the same preparation in a darker shade will be extremely slow setting, and in that case I would say that the attempt at a white was wholly impracticable.

I think it quite possible to do something along this line. The working in silicates gives the maker of zinc cement a hunch every little while, and I have seen chances to do something along the line of incorporating a snow-white foreign ingredient with a zinc oxid powder to give a whiter powder of good working qualities.

I have seen results with different silicious cements which have been very pleasing. I have seen Harvardid set promptly, give a satisfactory mass, presentable as far as appearances go, and render excellent service under strong mastication.

I have seen some good fillings of Ascher's. I think Dr. Shields was a little mixed when he mentioned Ascher's No. 1. No. 6 is Ascher's white. Ascher's No. 1 is a pigmented number. Ascher's No. 6 can be managed to be entirely safe, Nos. 4 and 5 being comparatively safe. With the other colors you have all had experience, so I do not have to tell you what they do. I have made the statement previously that Ascher's white powder can be safely pigmented for all colors and shades required.

Schoenbeck's cement can be mixed with its own liquid to answer very serviceably in all colors. I have demonstrated that with this powder and a liquid to give quicker setting, a better mass can be made than with Schoenbeck's cement entire.

I once showed to Dr. Low, of Buffalo, what can be done with mixing this Schoenbeck powder with a mixture of an acid phosphate and a fluosilicate, and he writes about these results in language which compares with what Dr. Perry has to say. He says "the only objection I can see is that, if I went into court to prove services of this kind, the jury could not find the fillings in the patient's mouth." It is possible with some combinations obtainable to do very beautiful and permanent work.

This much we may be sure of, some preparations obtainable will not have the most serious defects which cropped out in the early preparations. I have made powders for combination with my favorite liquid which were practically infusible, but which, because of being practically infusible, did not give satisfactory translucency. They were translucent as compared to a zinc cement, but not sufficiently so to be popular. I have seen such fillings four or five years old, upon occluso-proximal surfaces, and on corners of molars, getting all the stress of mastication with the cement practically intact. This was a fascinating subject to me a few years since, but I needed to give it up for some time because the fascination of it caused me to spend more time than I could spare from other work. I gave it up almost entirely for two years or more. A year ago it was taken up again in my enlarged laboratory, and we are doing some things of which we are proud. There is no need of saying much more than that. I believe, instead of being thoroughly disgusted with the silicious cement question, you all ought to have much hope of what may yet come of the combinations.

Dr. Rhein—I just want to ask one question. Is it conceivable from a chemical standpoint that any silicious cement can be mixed and set that is not liable under certain conditions of the oral fluids to some form of disintegration? Is not that always going to be a chemical possibility following out the chemical lines that are present in cements?

The point I want to bring out is that we all know that cements have lasted for twenty or thirty years, just as we get immunities

to caries for lengthy periods; and we all know in certain kinds of mouths there is not any power to resist decay, and it is that form of mouth conditions that to my mind make the possibility of the ideal cement filling something that it is hard for me to realize possible.

Dr. Ames—In tests of oxyphosphates of zinc, and silicious oxyphosphates, out of the mouth, in acid and alkaline solutions, there is no comparison in the ability of the two varieties to withstand these disintegrating media. There is no acid except sulphuric which will disintegrate these cements, and that is from the peculiar destructive effect upon fluorids. We do not have sulphuric acid present in the mouth to the extent of being considered. These cements should not be affected by alkalis.

Dr. Ottolengui—These fillings do waste away, Doctor? They disintegrate?

Dr. Ames—When this happens they too often have never set perfectly. There is then free phosphoric acid, or merely imperfectly crystallized phosphate, or else they are simply subject to sufficient attrition to wear them away, and they withstand this wonderfully.

In the cases coming under my notice, where a small filling would be placed on an approximal surface of a central incisor, for instance, and the teeth are unclean and mouth uncleanly, the products of fermentation and putrefaction will destroy an oxyphosphate of zinc filling, and in the same location a patient may literally disregard cleanliness as far as a good silicious cement is concerned. One such as might be mentioned would turn dark brown, but it would not be destroyed, and I have seen for three, four and five years small approximal fillings stand in such a way that you would not know whether they had been put in last week or five years ago; so that I say the matter is very encouraging, and, to definitely answer Dr. Rheins question, I believe there is no force except that of mastication that need be considered in connection with the better silicious cements.

A hearty vote of thanks was tendered to the essayist, and the gentlemen who took part in the discussion.

Adjournment.

J. RUSSELL WATSON,
Secretary.

OBITUARY.

Died, in Salem, Mass., Aug. 11, 1911, of heart disease, in his 62nd year, Horatio Meriam, D. M. D.

Dr. Horatio Meriam was born in Tewksbury, Mass., March 20, 1849. He was educated in the public schools of that place and Lowell and then went into the office of Dr. Gerry to prepare himself for his chosen profession.

In 1870 he entered the Dental School of Harvard University, continuing there that year until 1871. He then studied in the office of Dr. Batcheler of Salem, re-entering Harvard again in 1873 and graduating in the class of 1874.

In the fall of 1874 he established an office in Salem when he built up a large practice and practiced continuously for thirty-seven years.

During the years 1884 to 1885 he was chemical instructor at the Harvard Dental School and from 1885 to 1889 instructor in operative dentistry.

At the time of his death Dr. Meriam was the oldest active practitioner in point of practice belonging to the Essex Dental Association. He was a man who combined the practical with the ideal and was highly esteemed and looked up to by all the members of his profession. He was much interested in the welfare and progress of his profession, belonging to many societies.

The Harvard Alumni, the Harvard Odontological Society, American Academy, Massachusetts Dental Society, Essex Dental Association, Lynn Dental Society, New York Institute of Stomatology and honorary member of the Great Britain Odontological Society. He was also much interested in civic and social affairs belonging to the Essex Institute, Massachusetts Reform Club, the Horticultural Society.

He was a great lover of flowers, in the study and cultivation of which he passed many of his hours outside his professional duties.

Dr. Meriam was married to Edith Worcester of Salem, Sept. 12, 1878, who, together with five sons, survive him.

RESOLUTIONS.

Whereas, That in the demise of Dr. Horatio Meriam, the Almighty in His infinite power and wisdom has seen fit to remove him from our ranks, and

Whereas, He was a beloved member of our Association from its inception, and

Whereas, By his death the community and members of our profession have lost an earnest citizen, a zealous and untiring exponent of all the best principles of our profession, always teaching us the practical as well as the ideal side and ever ready to co-operate in any movement for the advancement of the profession, therefore be it

Resolved, That the Essex Dental Association deeply deplores his death and extends its sincere sympathy to the members of his immediate family in their bereavement and be it further

Resolved, That a copy of these resolutions be spread upon the minutes of this Association and a copy mailed to his family.

Committee on Resolutions,

F. E. JEFFREY, D. M. D., Pres.

F. E. RICE, D. D. S., Secretary.

E. O. RICHARDS, D. D. S.

W. G. FANNING, D. D. S.

M. C. SMITH, M. D., D. D. S.

OBITUARY.

Died, in Salem, Mass., July 27, 1911, of heart disease in his 67th year, Jesse Robbins, D. M. D.

In the demise of Dr. Jesse Robbins, one of the oldest and most highly esteemed members of our Association as well as one of the oldest practitioners in New England the Almighty in His infinite wisdom has removed from our ranks a beloved brother member to other fields beyond, after a career of untiring interest in everything pertaining to his profession.

Dr. Jesse Robbins was born in West Bromwich, England, on Feb. 28, 1845. After having come to this country he studied den-

tistry in the Dental Department of Harvard University whence he was graduated in 1871.

He established himself in Salem, Mass., and up to within the last few years has there successfully practiced his chosen profession. His interest in professional and civic affairs is evinced by his membership in the original staff of the Salem Hospital and in the Essex Dental Association of which he became a member soon after its formation.

He was married to Elizabeth Gibson of Salem, Mass., in 1869, who, together with one son, Fred. G. Robbins, also a dentist of Boston, survive him.

RESOLUTIONS.

Whereas, That in the demise of Dr. Jesse Robbins, the Almighty in His infinite power and wisdom has seen fit to remove from our ranks a beloved and highly esteemed brother member, and

Whereas, He has been a member of the Essex Dental Association since Nov. 17, 1910, and

Whereas, By his death the community and members of our profession have lost an earnest citizen, an eminent and highly esteemed member who through his career has always lived up to the best tenets of his profession, its welfare and progress, therefore be it

Resolved, That the Essex Dental Association deeply deplores his death and extends its sincere sympathy to the members of his immediate family, in their bereavement, and be it further

Resolved, That a copy of these resolutions be spread upon the minutes of this Association and a copy mailed to his wife and son.

Committee on Resolutions,

F. E. JEFFREY, D. M. D., President.

F. E. RICE, D. D. S., Secretary.

E. O. RICHARDS, D. D. S.

W. G. FANNING, D. D. S.

M. C. SMITH, M. D., D. D.S., D. M. D.

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